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TRADE NAME	MODEL	SET AND FOLDER No.
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Capehart	1P55 (Ch. CR-148)	268-4
David Bogen	R640, R640G	268-5
Emerson	810B (Ch. 120222-B)	268-6
Firestone	4-B-74	268-7
Magnavox	Chassis CR330AA-1	268-8
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RCA Victor	21-D-346 (Ch. KCS81D, E, RC-1111A, & RS-1411A) Tel. Rec. Prod. Chg. Bul. 116	268-1
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Wells-Gardner	321GM47-486, 2321GM47-488 Tel. Rec.	268-16

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 14 IN SET 170

Trav-ler Models 217-15 and 217-16 (Ch. 34A2) are covered in Photofact Folder 14 - Set 170. In later production several new models and chassis 35B2, 36A2, 36A3 and 36B2 have been added. A list of all the models with the chassis and picture tube used in each is given below. A list of the differences in each chassis is also given in this bulletin.

MODEL	CHASSIS	CRT	MODEL	CHASSIS	CRT
217-15	34A2	17HP4	220-35	36A2	20HP4A
217-16	34A2	17HP4	221-24	34A2	21FP4A
217-25	34A2	17HP4	221-27	35B2	21FP4A
217-32	36A2	17HP4	221-36	36A2	21FP4A
217-33	36A2	17HP4	317-33	36A3	17HP4
217-37	36A2	17HP4	317-37	36A3	17HP4
217-331	36B2	17BP4	317-60	36A3	17HP4
217-371	36B2	17BP4	317-62	36A3	17HP4
220-22	34A2	20HP4A	320-35	36A3	20HP4A
220-23	34A2	20HP4A	321-36	36A3	21FP4A
220-26	34A2	20HP4A	321-63	36A3	21FP4A
220-34	36A2	20HP4A			

Ch. 35B2

Chassis 35B2 is identical to Ch. 34A2, except, the TV-TA-7 RF tuner is used and the first and second video IF cathode resistors were increased from 47Ω to 82Ω.

A schematic of this tuner is given on the reverse side.

Ch. 36A2

Chassis 36A2 is identical to Ch. 34A2, except, for the following:

The video IF strip was revised. (1) The first and second video IF cathode resistors (R25 and R28) were increased from 47Ω to 82Ω. (2) The third and fourth video IF transformers were changed to part no. L-42B and L-42C, respectively. These transformers contain a 20.6MC trap in the transformer.

The TV-TA-9 RF tuner is used in Ch. 36A2. A schematic of this tuner is given

Ch. 36A2

In later production of Ch. 36A2 the following changes were made:

The vertical hold control was increased from 1Meg to 1.5Meg (part no. VC-39).

C68 was increased from 2200MMF to 4700MMF.

C74 was reduced from 680MMF to 470MMF.

A 47Ω, 1 watt, resistor with a .05MFD bypass capacitor was added from the cathode of the horizontal output tube (V17) to ground, instead of connecting the cathode to ground directly. When this change is made the screen bypass capacitor (C76) was returned to the cathode of V17 instead of to ground directly. An 18KΩ, 1 watt, resistor was also added in series with the V17 screen resistor (R90) to the fuse (M2).

The high voltage rectifier (V19) was changed from a type 1X2 to a type 1AX2 tube. When this change was made the 3.3Ω filament dropping resistor (R92) was omitted.

TRAV-LER MODELS 217-15, -16, -25(Ch. 34A2), 217-32, -33, -37(Ch. 36A2), 217-331, -371(Ch. 36B2), 220-22, -23-26 (Ch. 34A2), 220-34, -35(Ch. 36A2), 221-24(Ch. 34A2), 221-27(Ch. 35B2), 221-36(Ch. 36A2), 317-33, -37, -60, -62, 320-35, 321-36, -63(Ch. 36A3)

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PRODUCTION CHANGES
BULLETIN 116

PRODUCTION CHANGES
BULLETIN 116

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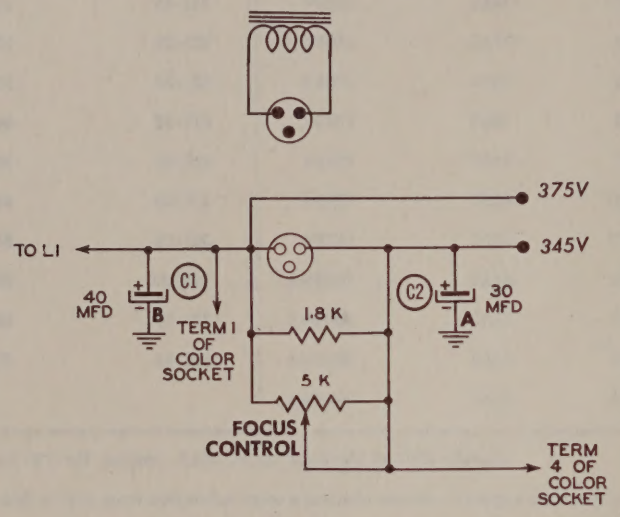
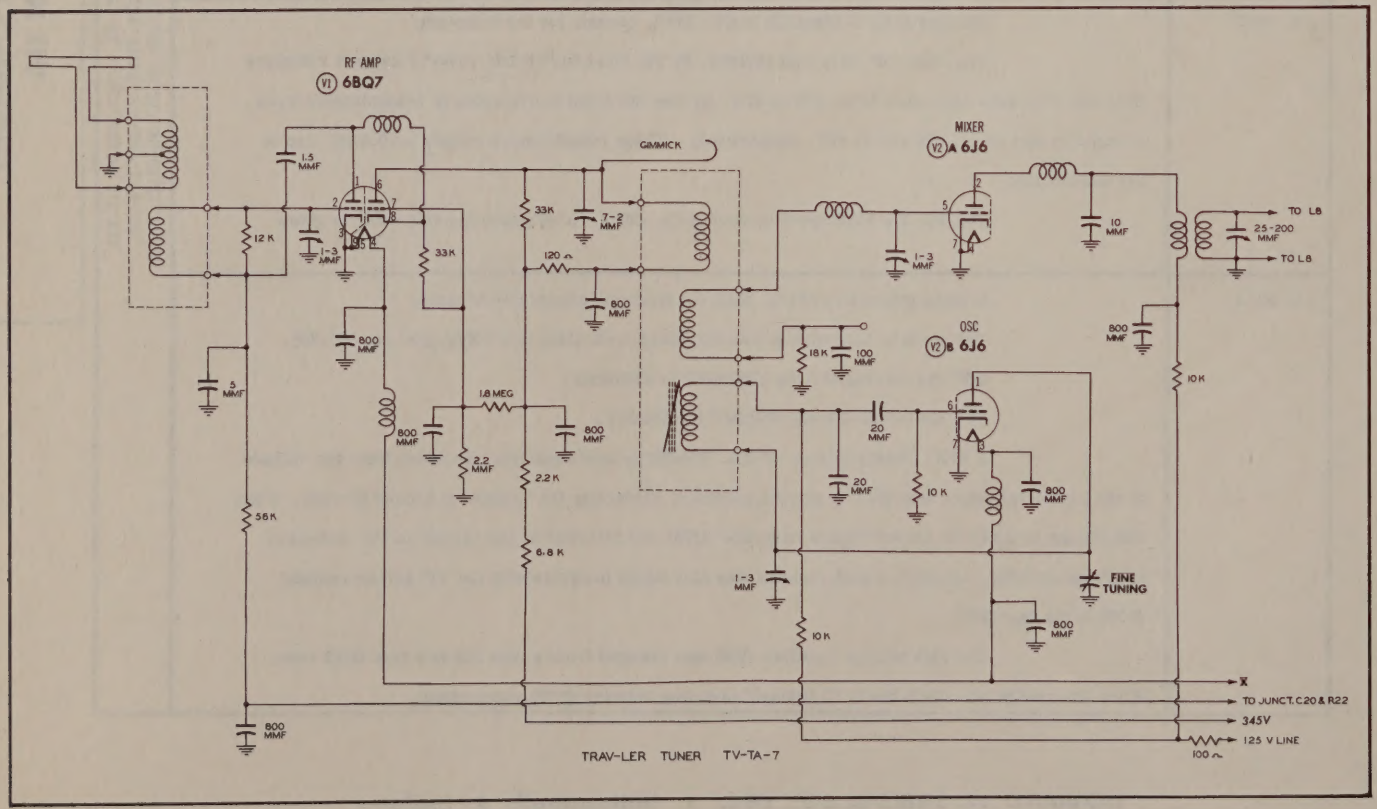
Ch. 36A3	Chassis 36A3 is identical to later production of Ch. 36A2.
Ch. 36B2	Chassis 36B2 is identical to later production of Ch. 35A2, except, an electro-magnetic focus picture tube (17BP4) is used. When this tube is used a focus coil and focus control (part no. VC-39) were added as shown in the revised low voltage power supply circuit below and R3, R98 and C84 were omitted.





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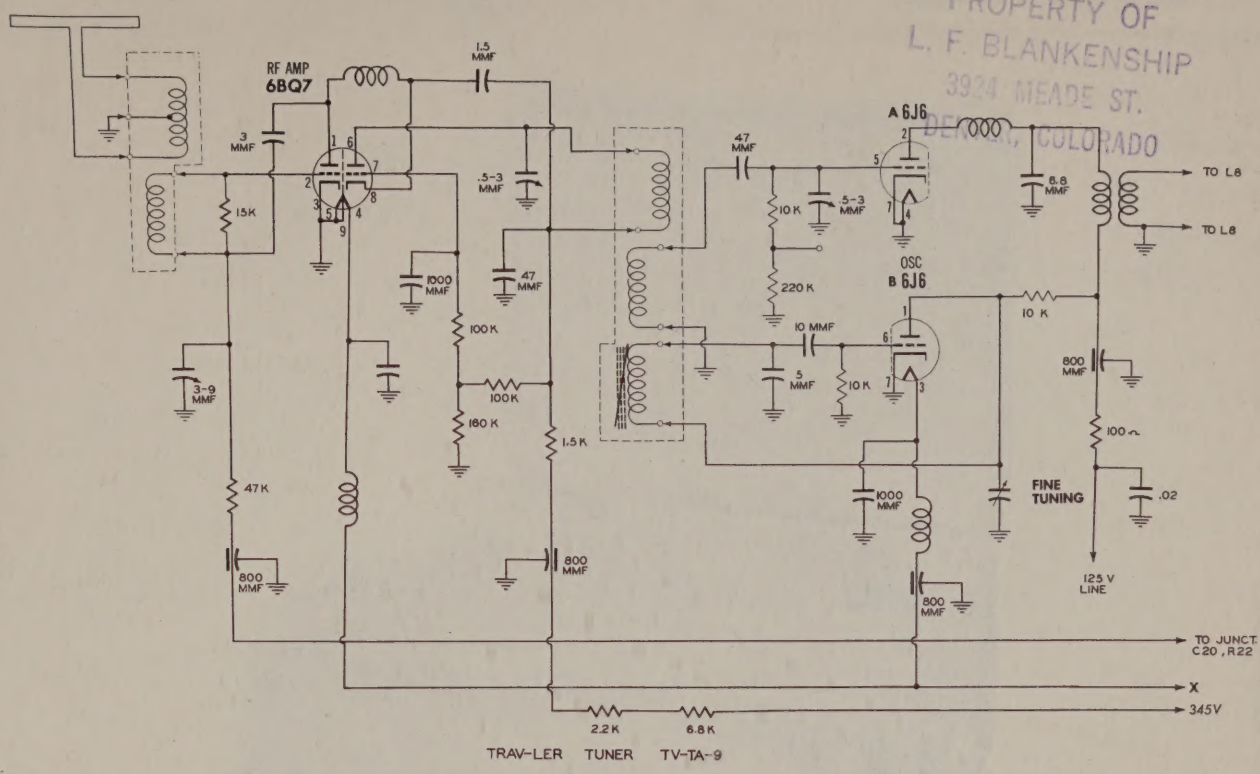

TRAV-LER MODELS 217-15, -16-25 (Ch. 34A2), 217-32, -33, -37 (Ch. 36A2), 217-331, -371(Ch. 36B2), 220-22, -23, -26 (Ch. 34A2), 220-34, -35 (Ch. 36A2), 221-24 (Ch. 34A2) 221-27(Ch. 35B2), 221-36(Ch. 36A2), 317-33, -37, -60, -62, 320-35, 321-36, -63(Ch. 36A3)

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 3 IN SET 218

	Airline Models 35GSL-3064A, B and 35GSL-3083A, B were covered in Photofact Folder 3 — Set 218. In later production the following production changes were made.
Models GSL-3064C GSL-3083C	Models GSL-3064C and GSL-3083C are identical to models 35GSL-3064C and 35GSL-3083C, respectively, except a 17HP4, glass picture tube, is used in place of the 17TP4 metal picture tube.
Models GSL-3064D GSL-3083D	Models GSL-3064D and GSL-3083D are identical to models GSL-3064C and GSL-3083C, respectively, except for the following: C73 was changed from 43MMF, 2000V, 5%, to a 43MMF, 2000V, 10%, unit. R29 was omitted and the contrast control was connected directly to the cathode of V6. L13 was changed to 294 microhenries, wound on an 8.2KΩ resistor. L15 was changed to 500 microhenries, wound on a 6.8KΩ resistor. R33, in series with the brightness control, was reduced from 220KΩ to 120KΩ. R34 was increased from 220KΩ to 470KΩ.

AIRLINE MODELS GSL-3064C, D, GSL-3083C, D

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 7 IN SET 219

Ch. KCS81D, E	RCA Victor model 21-D-346, U (Ch. KCS81D, E, Radio Ch. RC-1111A and Audio Amp. Ch. RS-141A) are covered in Photofact Folder 7 — Set 219. Later production changes in this chassis are given below. The 22KΩ, RF Amp. Grid (pin 7) resistor in the KRK22A tuner, shown on page 29 in Photofact Folder 7 — Set 219 was reduced to 6.8KΩ. In later production the connections to the Height Control (R4) were removed. The center arm is not connected to R100 and the side formerly connected to R100 is now connected to the junction of C4 and R102. In later production a 10Ω resistor was added from the screen (pin 6) of the third video IF amplifier (V7) to the junction of C39B and R45. In later production L31, connected between the plate cap of the horizontal output tube (V19) to terminal 2 of the horizontal output transformer (T3) was increased from 4.7 microhenries to 6.8 microhenries (part no. 78598).

RCA VICTOR MODEL 21-D-346 (Ch. KCS81D, E, RC-1111A & RS-141A)

RETMA MEMBER

AIRCASTLE MODEL 652.3A6S.1

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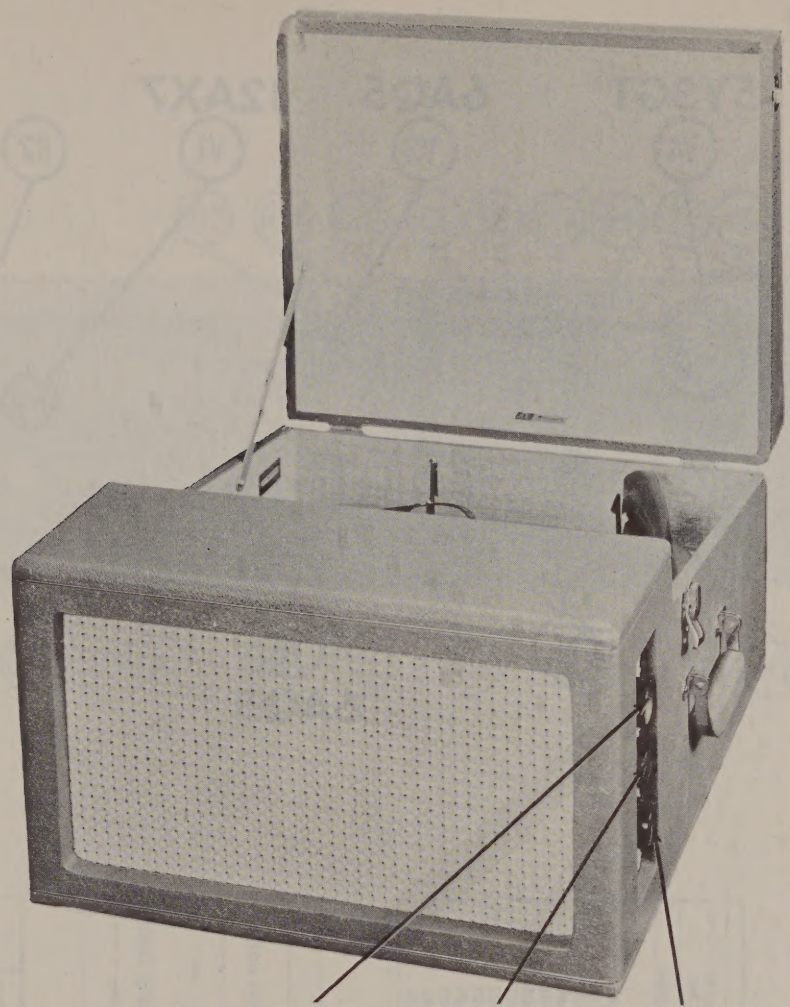
AIRCASTLE
MODEL 652.3A6S.1



AIRCASTLE
MODEL 652.3A6S.1

TRADE NAME	Aircastle Model 652.3A6S.1
SUPPLIER	Spiegel, Inc., 1061 W. 35th. St., Chicago 9, Illinois
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Four)	Types 12AX7 AF Amp.-Phase Inv., (2) 6AQ5 Audio Output, 5Y3GT Rectifier
POWER SUPPLY	105-125 Volts AC-60 Cycles RATING .47 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT PART NO. 950-179 - SEE V-M MODEL 950 IN PHOTOFACT SET #216 - FOLDER 11 or RECORD CHANGER MANUAL CM-5.

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PARTS LIST AND DESCRIPTIONS

AIRCASTLE
MODEL 652.3A6S.1

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	AF Amplifier - Phase Inverter	12AX7	12AX7	9A	
V2	Output	6AQ5	6AQ5	7BZ	
V3	Output	6AQ5	6AQ5	7BZ	
V4	Rectifier	5Y3GT	5Y3	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AIRCASTLE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	40	350	CE1020	AFH3-44		C035		FP377	TVL-3787
B	40	300							
C	40	300							
C2	5000		CC502-5	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C3	.1	400	CP104-4	P488-1	DF-104	CUB4P1		PT401	4TM-P1
C4	100		CC101-5	S1100	D6-101	TP34	GP1K-101	UC-531	5GA-T1
C5	.1	400	CP104-4	P488-1	DF-104	CUB4P1		PT401	4TM-P1
C6	.01	600	CP103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1
C7	5000		CC502-5	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C8	1500		CC152-5 ①	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15
C9	.02	400	CP203-4	P488-02	DF-203	CUB4S2	817-02	PT412	4TM-S2
C10	.1	400	CP104-4	P488-1	DF-104	CUB4P1		PT401	4TM-P1
C11	.1	400	CP104-4	P488-1	DF-104	CUB4P1		PT401	4TM-P1
C12	.05	400	CP503-4 ②	P488-05	DF-503	CUB4S5		PT415	4TM-S5
C13	.01	600	CP103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1
C14	.01	600	CP103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1

① Not used in all versions.
② Some versions use .1MFD in this application (part no. CP104-4).

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	VC-60	Q11-B7	A47-1Meg-S	AB-69	U-54	Bass - Note 1
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	1Meg	½	VC-60	Q11-B7	A47-1Meg-S	AB-69	U-54	Treble - Note 1
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
R3A	3.25Meg	½	VC-1			ABT-8515		Volume -tapped ⓐ 250KΩ
B	Shaft		Not Req.			AK-4		Attach to R3A

Note 1. Some versions may use an alternate control part no. VC-59.

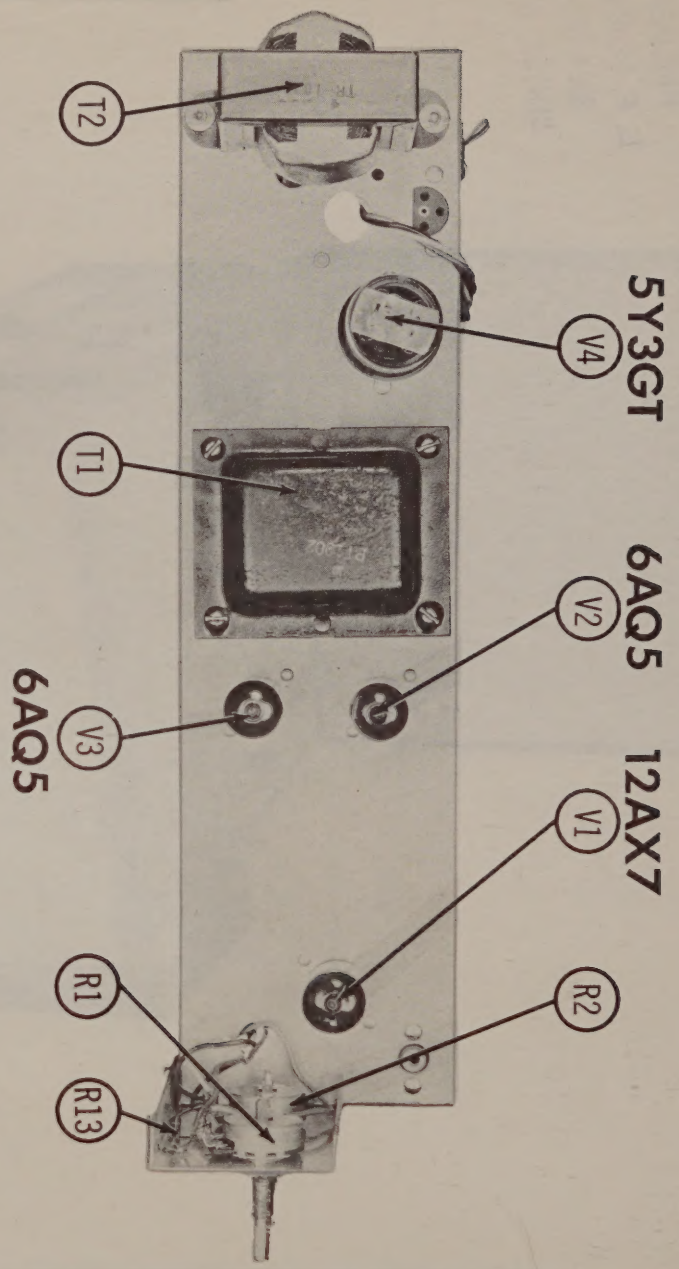
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R4	47KΩ	½		BTS-47K	
R5	33KΩ	½		BTS-33K	Note 1
R6	2200Ω	½		BTS-2200	
R7	220KΩ	½		BTS-220K	
R8	47KΩ	½		BTS-47K	
R9	2200Ω	½		BTS-2200	
R10	220KΩ	½		BTS-220K	
R11	47KΩ	½		BTS-47K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AIRCASTLE PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R12	10KΩ	½		BTS-10K	Note 2
R13	22KΩ	½		BTS-22K	
R14	470KΩ	½		BTS-470K	
R15	220Ω	5	RW221-17		
R16	470KΩ	½		BTS-470K	
R17	330Ω	2		BTB-330	
R18	2200Ω	1		BTA-2200	

Note 1. Not used in all versions.
Note 2. Some versions may use a 6800Ω in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRCASTLE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ②.47A	514VCT .064ADC	5VAC ② 2A	6.3VAC ②1.2A	PT1002	PM-8404 ①②	P-3051	R-108 ①②	P9205 ②	22R01 ②

① Drill new mounting holes.
② Tape 6.3V center tap.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRCASTLE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	8.3KΩ CT	*.78Ω	TR-102						

* Total DC resistance - tap is at 1.6Ω impedance.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	
SP1	6"	PM	3.2Ω		ST-108 Mod. P6-X	6A21	
SP2	6"	PM	3.2Ω		ST-108 Mod. P6-X	6A21	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							REMARKS
	AIRCASTLE PART No.	ASTATIC PART No.		SHURE PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1						47	0-1 or S-1 & 0-3	

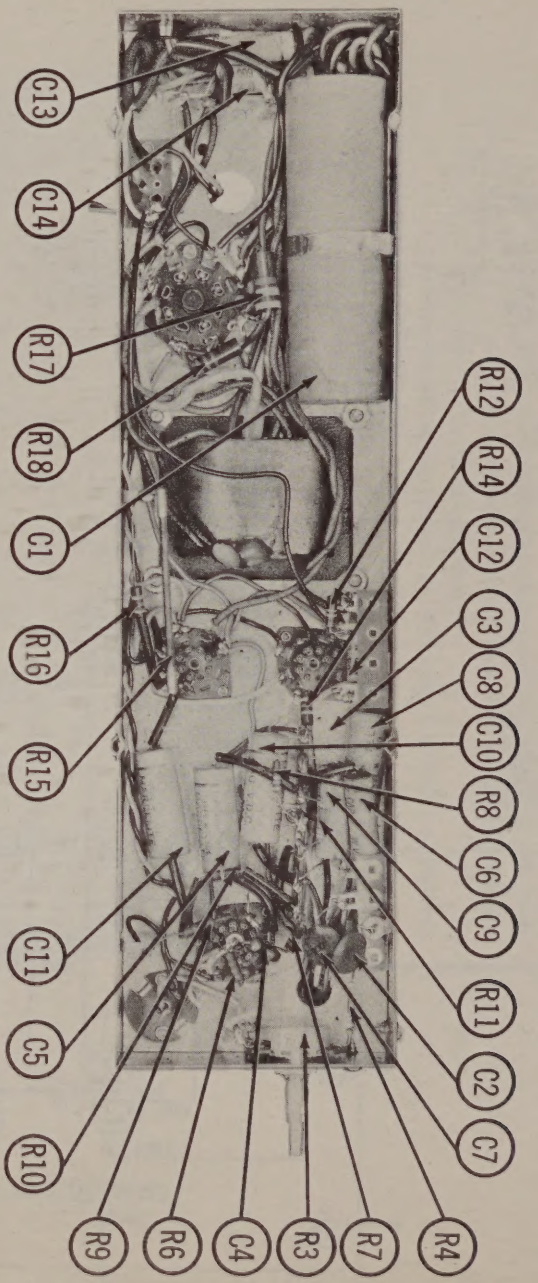
ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	AIRCASTLE PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2		†S-66 or ♦†S-66SD or ♦S-66D	†AC-434 or ♦†AC-434D1 or †♦AC-434D2 or ♦AC-434D	†W-75TES or ♦†W-75DS or ♦W-75TPD	†Jewel ♦ Diamond

CHASSIS—BOTTOM VIEW



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AIRCASTLE MODEL 652.3A68.1

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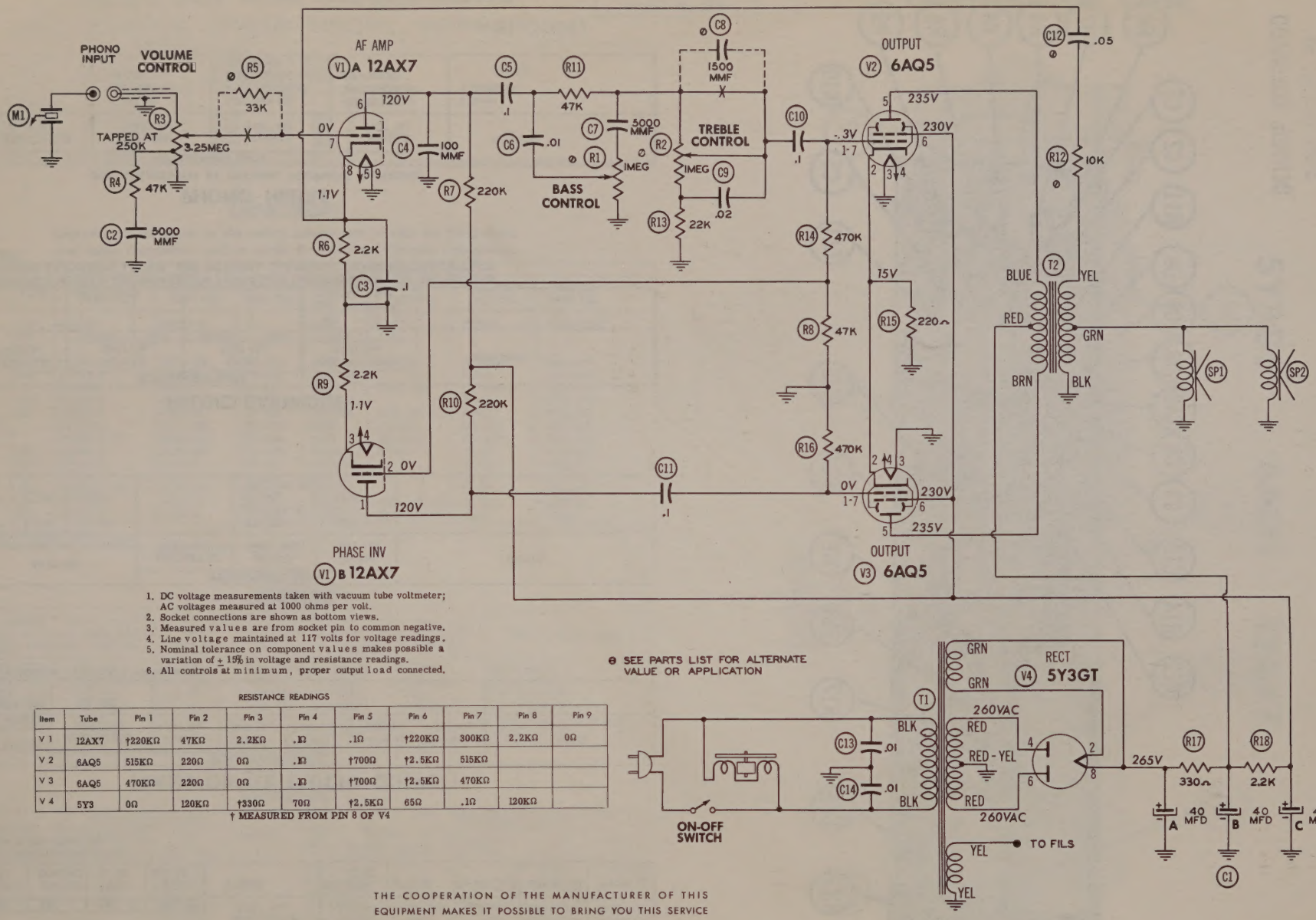

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PHOTOFACT* Folder

BENDIX MODELS KM21E, EU, KMT21E, EU, TB21E, EU, TM21E, EU (Ch. T14-15, T14-16)

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MODEL TM21E

BENDIX MODELS KM21E, EU, KMT21E, EU, TB21E, EU, TM21E, EU (Ch. T14-15, T14-16)

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DATE 2–55 SET 268 FOLDER 3

PHOTOFACT* Folder
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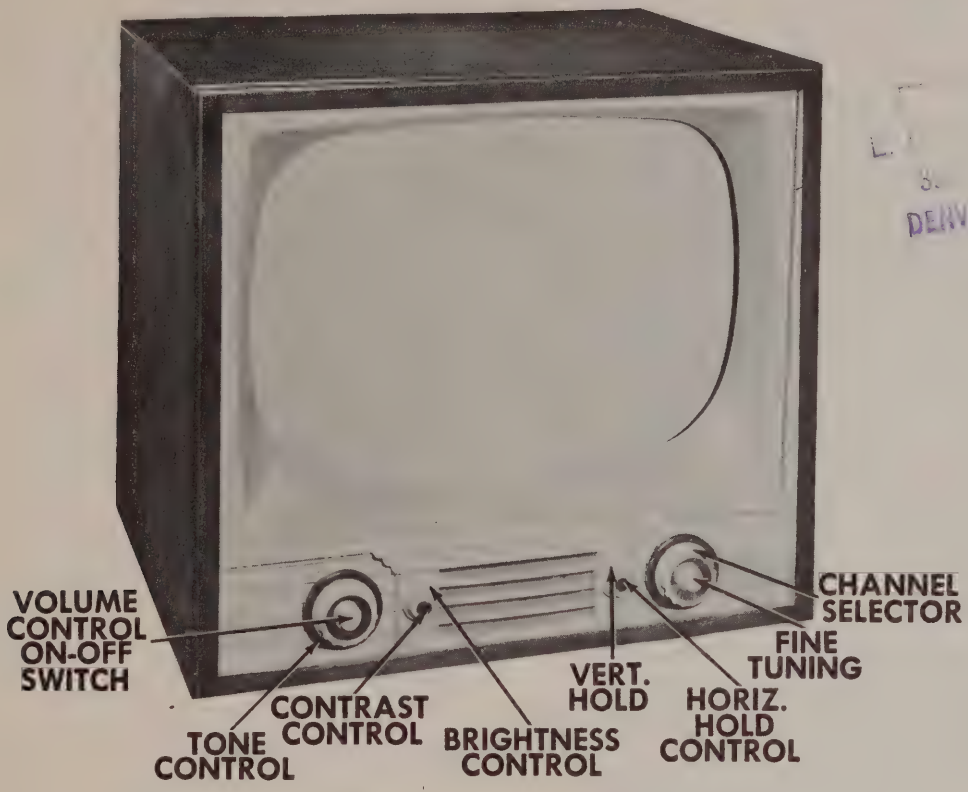
BENDIX MODELS KM21E, EU, KMT21E, EU, TB21E, EU, TM21E, EU (Ch. T14-15, T14-16)



DENVER

BENDIX MODELS KM21E, EU, KMT21E, EU, TB21E, EU, TM21E, EU (Ch. T14-15, T14-16)

BENDIX MODEL TM21E

TRADE NAME	Bendix	MODELS	CHASSIS
		KM21E, KMT21E, TB21E, TM21E	T14-15
		KM21EU, KMT21EU, TB21EU, TM21EU	T14-16
MANUFACTURER	Bendix Radio, Division of Bendix Aviation Corp., Baltimore, Md.		
TYPE SET	Television Receiver		
TUBES	Twenty-three		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.7 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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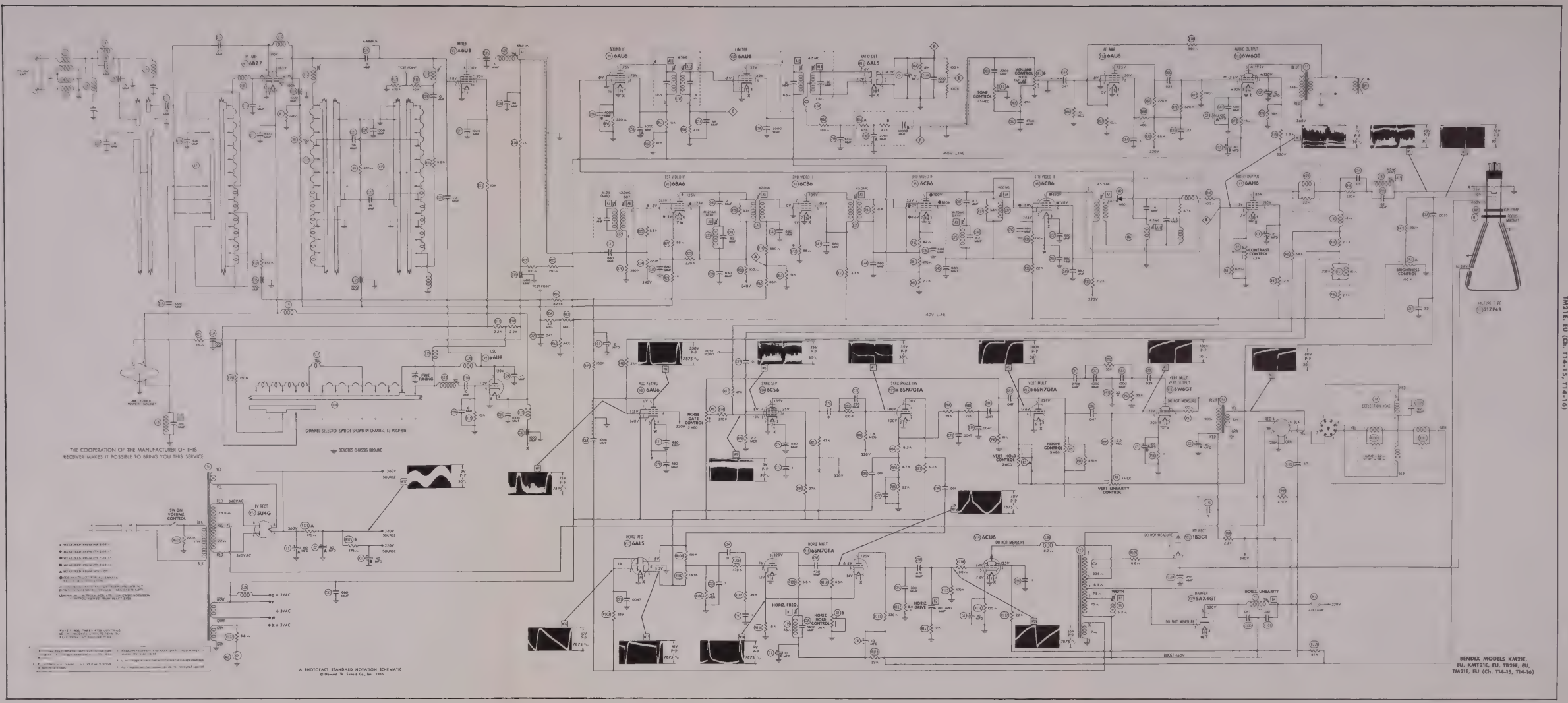
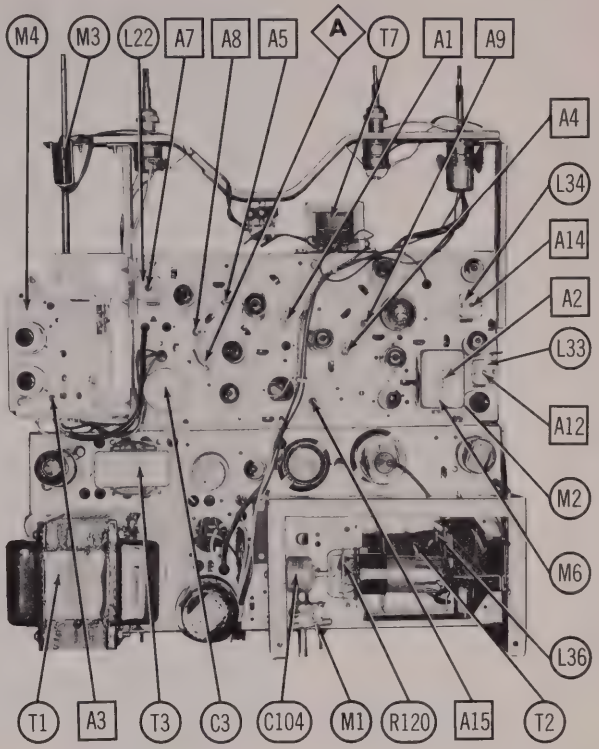

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
BENDIX MODELS KM21E, EU, KMT21E, EU, TB21E, EU, TM21E, EU (Ch. T14-15, T14-16)

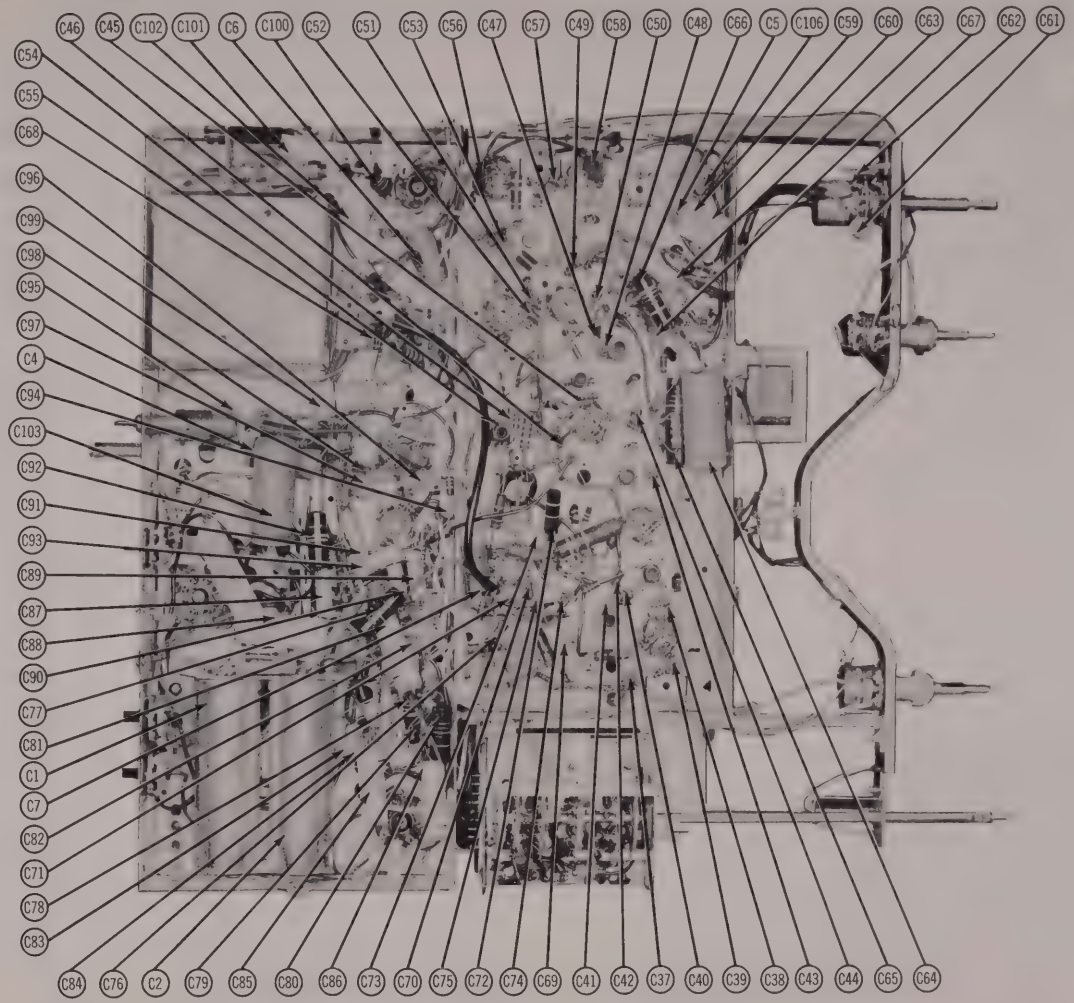
BENDIX MODELS KM21E, EU, KMT21E, EU, TB21E, EU, TM21E, EU (Ch. T14-15, T14-16)



CHASSIS TOP VIEW

SET 268 FOLDER 3

BENDIX MODELS KM21E, EU, KM72 1E, EU, T621E, EU, TM21E, EU (Ch. T14-15, T14-16)

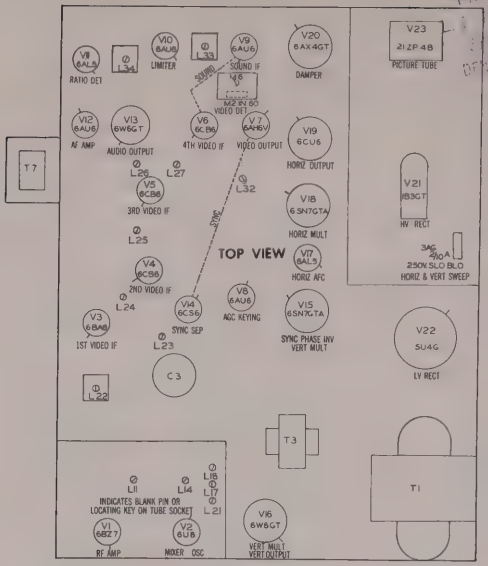


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. MANSHIP

BENDIX MODELS KM21E, RU, KM12E, RU, TA21E, RU, TA21E, RU (CH. T14-15, T14-16)

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V23**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V13**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V9, V23**
Has pic, no sound - **V9, V10, V11, V12, V13**
Overloaded picture - **V8**

SYNC FAILURE
No vert. sync - **V15, V16**
No horiz. sync - **V15, V17, V18**
No vert. or horiz. sync - **V14, V15**

SWEEP FAILURE
No raster, has sound - **V16, V19, V20, V21, V23, Fuse (M1)**
No vertical deflection - **V15, V16**
Poor vert. linearity or foldover - **V15, V16**
Poor horiz. linearity or foldover - **V18, V19, V20**
Narrow picture - **V18, V19, V20, V21, V22**
Vert. off freq. - **V15, V16**
Horiz. off freq. - **V15, V17, V18**

BENDIX MODELS KM21E, EU, KM721E, EU, TB21E, EU, TM21E, EU (Ch. 1T4-15, 1T4-16)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multi tube V18 to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the AGC keying tube (V8) from its socket.
Connect the negative lead of a 3 volt battery to point (A).
Connect the positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1	Direct	High side to an ungrounded tube shield floating over mixer-osc. tube (V3). Low side to chassis.	Not used	45MC	Any unused channel.	Use VTVM DC probe to point (B). Common to chassis.	A1, A2, A3	Adjust for maximum deflection.
2	"	"	"	42MC	"	"	A4, A5, A6	"
3	"	"	"	41.25MC	"	"	A7, A8	Turn marker generator output to maximum. Adjust for MINIMUM deflection.
4	"	"	"	39.75MC	"	"	A9	"
5	"	"	43MC (10MC Swp)	39.75MC 41.25MC 45.75MC	Any channel that causes no interference.	Vertical amp. to point (B). Low side to chassis.		Check for response curve similar to Fig. 1. If necessary, SLIGHTLY retouch A1 thru A6 for proper response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect the negative lead of a 9 volt battery to point (A).
Connect the positive lead to chassis.
Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (C) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
6	.01MFD	High side to pin 1 (grid) of video amp. (V7). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to point (C). Common to chassis.	A10, A11, A12	Adjust for maximum deflection.
7	"	"	"	"	DC probe to point (B). Common to chassis.	A13	"
8	"	"	"	"	DC probe to point (C). Common to point (B).	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Connect the negative lead of a 9 volt battery to point (A).
Connect the positive lead to chassis.
Use frequency modulated signal with 80% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6	.01MFD	High side to pin 1 (grid) of video amp. (V7). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. amp. to point (B). Low side to chassis.	A10, A11, A12	Adjust for response curve similar to Fig. 2.
7	"	"	"	"	"	Vert. amp. to point (B). Low side to chassis.	A13, A14	Adjust A14 until 4.5MC occurs at center of crossover lines as shown in Fig. 3. Adjust A13 for maximum amplitude and symmetry of crossover lines.

TUNER ALIGNMENT

The RF tuner in this set has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

4.5MC TRAP ADJUSTMENT

Tune in a TV station and examine the picture for evidence of 4.5MC interference (grain effect in horizontal lines). If 4.5MC interference is encountered, adjust 4.5MC trap (A15) for minimum interference.

FIG. 1

FIG. 2

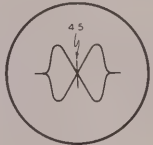
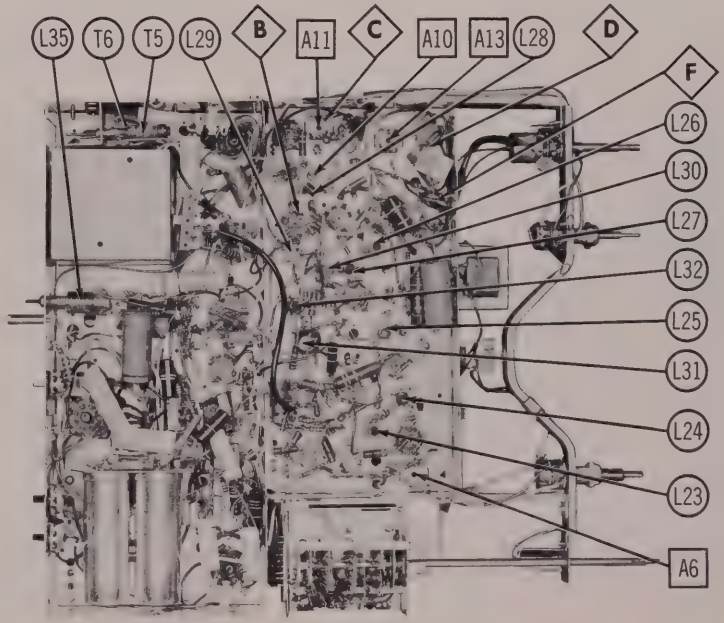


FIG. 3



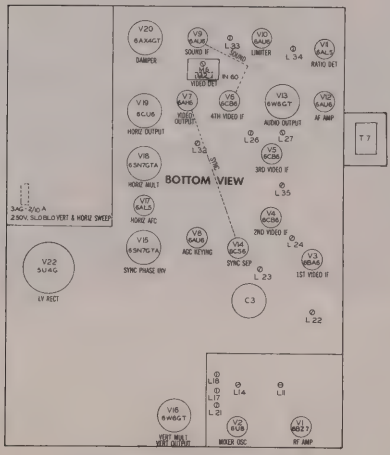
PROPERTY OF
L. F. BLANKENSHIP
3924
DENVER, COLORADO

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

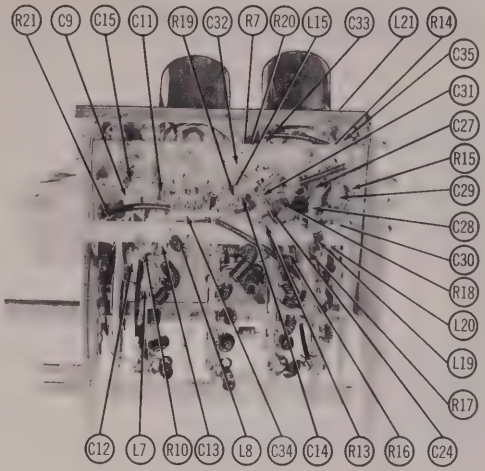
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	■1. 5KΩ	■480KΩ	INF	. 1Ω	0Ω	INF	700KΩ	0Ω	0Ω
V 2	6U8	▲2. 5KΩ	♦80KΩ	▲15KΩ	. 1Ω	0Ω	▲1. 3KΩ	0Ω	0Ω	15KΩ
V 3	6BA6	130KΩ	200KΩ	30KΩ	30KΩ	↑300Ω	↑300Ω	■68Ω		
V 4	6CB6	50KΩ	8Ω	0Ω	. 1Ω	▲3. 3KΩ	▲3. 3KΩ	0Ω		
V 5	6CB6	3. 2KΩ	3. 3KΩ	. 1Ω	0Ω	▲22KΩ	▲22KΩ	3. 2KΩ		
V 6	6CB6	▲22KΩ	50KΩ	30KΩ	30KΩ	↑2. 6KΩ	↑2. 6KΩ	50KΩ		
V 7	6AH6	1. 2KΩ	60Ω	0Ω	. 1Ω	▲5. 4KΩ	▲12KΩ	60Ω		
V 8	6AU6	▲35KΩ	♦0Ω	30KΩ	30KΩ	200KΩ	↑350Ω	♦0Ω		
V 9	6AU6	2. 8Ω	0Ω	0Ω	. 1Ω	▲15KΩ	▲15KΩ	220Ω		
V 10	6AU6	47KΩ	0Ω	0Ω	. 1Ω	♦500Ω	♦500Ω	0Ω		
V 11	6AL5	INF	INF	0Ω	. 1Ω	0Ω	0Ω	12KΩ		
V 12	6AU6	10Meg	0Ω	0Ω	. 1Ω	↑280KΩ	↑1. 3Meg	1Ω		
V 13	6W6GT	INF	30KΩ	↑350Ω	↑4. 3KΩ	460KΩ	↑68KΩ	30KΩ	▲150Ω	
V 14	6CB6	40KΩ	0Ω	0Ω	. 1Ω	▲47KΩ	▲27KΩ	2. 2Meg		
V 15	6SN7GTA	▲1. 8Meg	▲3. 3KΩ	35KΩ	2Meg	▲1. 8Meg	0Ω	0Ω	. 1Ω	
V 16	6W6GT	INF	. 1Ω	↑3. 5KΩ	↑3. 6KΩ	2. 5Meg	240KΩ	0Ω	1KΩ	
V 17	6AL5	33KΩ	33KΩ	0Ω	. 1Ω	4. 8Meg		4. 8Meg		
V 18	6SN7GTA	5Meg	▲27KΩ	1. 8KΩ	60KΩ	▲380KΩ	1. 8KΩ	1Ω	0Ω	
V 19	6CU6	INF	. 1Ω	33KΩ	↑22KΩ	470KΩ	470KΩ	0Ω	100Ω	Top Cap ♦8. 5Ω
V 20	6AX4GT	INF	INF	INF	INF	↑400Ω	INF	30KΩ	30KΩ	
V 21	1B3GT	PINS 1-8 HAVE INFINITE RESISTANCE								Top Cap ▲340Ω
V 22	5U4G	INF	40KΩ	0Ω	22Ω	↑175Ω	24Ω	INF	40KΩ	
V 23	2I2P4B	0Ω	▲310KΩ	PIN 10 ▲47KΩ	PIN 11 ▲240KΩ	PIN 12 1Ω				

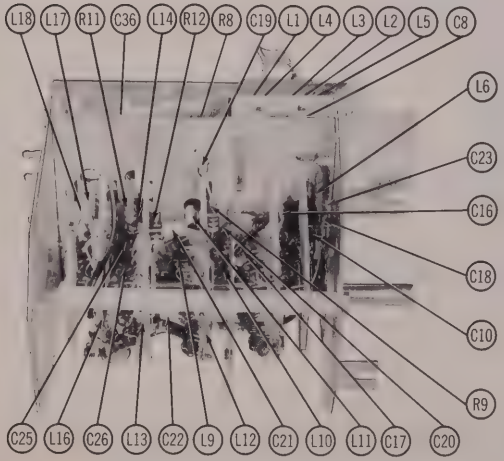
■ MEASURED FROM PIN 2 OF V3
▲ MEASURED FROM 140V LINE
↑ MEASURED FROM PIN 2 OF V22
♦ MEASURED FROM PIN 7 OF V5
▲ MEASURED FROM PIN 3 OF V30



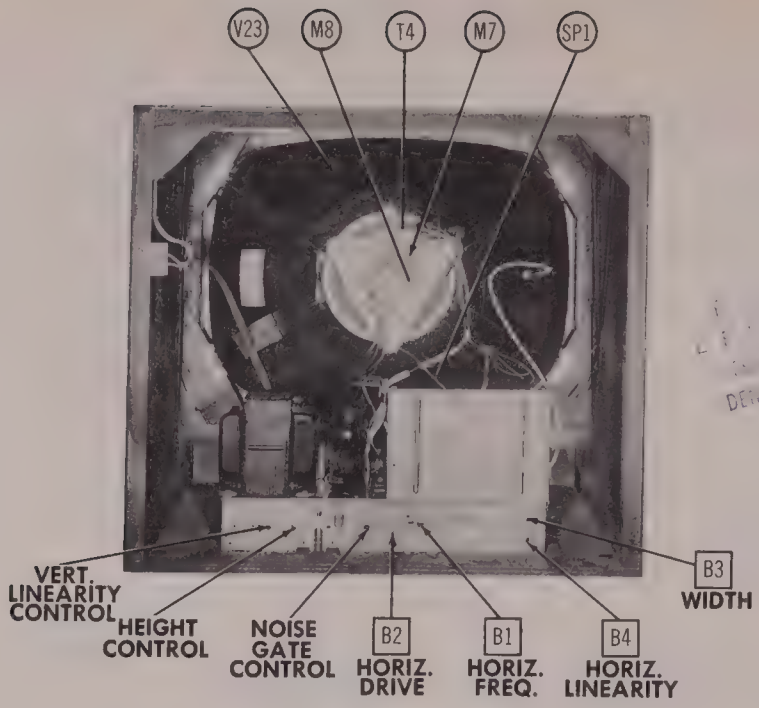
TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Turn the horizontal hold control to the center of its range.

Adjust the horizontal frequency slug (B1) to the center of the range over which the picture synchronizes horizontally.

Adjust the horizontal drive trimmer (B2) counter clockwise as far as possible without the presence of a white line or foldover occuring in the picture.

Adjust the width slug (B3) until the picture is slightly wider than necessary to fill the mask horizontally.

Adjust the horizontal linearity slug (B4) until the picture is symmetrical from left to right.

ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19, V20 and V32. Check adjustments B3, B3 and B4. Check T2, T4A, C99, R117, R116 and other associated components.

DRIVE LINES

Check by substitution V19 and V20. Check adjustments B2 and B4. Check C98, C97, R117, R116, R113 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V19 and V20. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V18, V19 and V20. Check C92 for open. Check L35, C95, R108 and other associated components.

XMAS TREE EFFECT

Check by substitution V18, V19 and V20. Check T2 and T4A for internal arcing. Check L35, C95, C96, C98, R109, R111 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V15 and V16. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T3, T4B, C87, C2B, C103, R98 and other associated components.	Check C86, C81, C82, R5, R99 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V15 and V16. Check height and vertical linearity controls for proper operation. Check T3, T4B, R99 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V15 and V16. Check R99, R91, R5 and other associated components.

COMPRESSED AT TOP

Check by substitution V15 and V16. Check R4, R95, R96, C3D and other associated components.

FOLDS

Check by substitution V15 and V16. Check C84, R94 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V14 and V15. Check C72, C75, C76, R81, R87, R83, R80 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V15. Check C80, C81, C84, R3A, R89, R88 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V17 and V18. Check C93, C96, C95, L35, R109, R108, R110 and R3B. Check horizontal AFC network.

HORIZONTAL BENDING

Check by substitution V8, V14, V15, V17 and V18. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V7. Check L29, L30, L31, R44, R42, C54 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A15. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check contrast control. Check video crystal detector network. Check R51, R43, C54 and other associated components.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check video crystal detector network. Check L29, R43, C54 and other associated components.

SMEAR

Substitute V7. Check video crystal detector network. Check L29, L31, L32, R43, C54 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11, V12 and V13. Check stages V12 and V13 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value. Check R60 and C46.	Check C63, C66, C2C, C3A, R68, R69, R70, R73, R75, T7, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A14. If still unsatisfactory, check audio IF alignment.

MUFFLED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V22. Check V13. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V22. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		BENDIX PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BZ7	6BZ7	9AJ	
V2	Osc-Mixer	6U8	6U8	9AE	
V3	1st Video IF Amp.	6BA6	6BA6	7BK	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6CB6	6CB6	7CM	
V6	4th Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	6AH6	6AH6	7BK	
V8	AGC Keying	6AU6	6AU6	7BK	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Limiter	6AU6	6AU6	7BK	
V11	Ratio Det	6AL5	6AL5	6BT	
V12	AF Amp.	6AU6	6AU6	7BK	
V13	Audio Output	6W6GT	6W6GT	7S	
V14	Sync Sep.	6CS6	6CS6	7CH	
V15	Sync Phase Inv. - Vert. Mult.	6SN7GTA	6SN7GTA	9BD	
V16	Vert. Mult-Vert. Output	6W6GT	6W6GT	7S	
V17	Horiz. AFC	6AL5	6AL5	6BT	
V18	Horiz. Mult.	6SN7GTA	6SN7GTA	9BD	
V19	Horiz. Output	6CU6	6CU6	6AM	
V20	Damper	6AX4GT	6AX4GT	4CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	LV Rectifier	5U4G	5U4G	5T	

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L. T. [illegible]
3924 [illegible]
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	BENDIX PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No	WESTINGHOUSE PART No.		
V23	21ZP4B	21ZP4B 21ZP4A	21ZP4B 21ZP4A	21ZP4B 21ZP4A 21ZP4 ①	21ZP4B 21ZP4A	12N 12N 12D	① Circuit changes necessary.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	BENDIX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No	
C1A	▲80	450	267005-8	AFH3-46		C037		FP378	TVL-3782	
B	■40	450								
C	▲10	450								
C2A	▲80	450	267005-8	AFH3-46		C037		FP378	TVL-3782	
B	■40	450								
C	▲10	450								
C3A	▲100	200	267005-14	AFH4-41		D036		FP423.4	TVL-4516	
B	■40	200								
C	▲10	200								
D	100	50								
C4	10	350	267024-14	PRS350/10		BR1225		TC52	TVA-1504	
C5	10	50	267024-25	PRS50/10		BR105		TC32	TVA-1304	
C6	10	50	267024-15	PRS50/10		BR105		TC32	TVA-1304	
C7	2	50	267024-27	PRS150/4		BSR-2-50T		TC302	TVA-1301	
C8	150		SI150	D6-151	G046	GP1K-151	UC-5315		5GA-T15	
C9	15		SI15	D6-150	G021	GP1K-150	UC-5415		5GA-Q15	
C10	18		SI18	D6-180	G022	GP1K-180	UC-5418		5GA-Q18	
C11	‖									
C12	‖									
C13	2.7									
C14	1000			EF-001	MFT-1000				503C-D1	
C15	1000			EF-001	MFT-1000				530C-D1	
C16	6.8		SI6.8NP0	TCZ-6.8	TZ06	NP0K-6R8	ERIE	ZT-5568	5TCCB-V68	
C17	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C18	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C19	1000			EF-001	MFT-1000				503C-D1	
C20	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C21	.56									
C22	.91									
C23	6.8		SI6.8NP0	TCZ-6.8	TZ06	NP0K-6R8		ZT-5568	5TCCB-V68	
C24	.3									
C25	1.2									
C26	15		SI15	D6-150	G021	GP1K-150		UC-5415	5GA-Q15	
C27	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C28	1.5									
C29	10		SI10	D6-100	G018	GP1K-100		UC-5410	5GA-Q10	
C30	10		SI10	D6-100	G018	GP1K-100		UC-5410	5GA-Q10	
C31	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C32	1000			EF-001	MFT-1000				503C-D1	
C33	1000			EF-001	MFT-1000				503C-D1	
C34	1000			EF-001	MFT-1000				503C-D1	
C35	5			SI5	D6-050	TP06	GP1K-050		NT-555	5TCUB-V5
C36	82			SI82	D6-820	TZ28	GP1K-820		UC-5482	5GA-Q62
C37	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C38	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C39	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C40	‖									
C41	62	500				22R5Q62				
C42	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C43	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C44	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C45	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C46	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C47	4.7			SI4.7NP0	TCZ-4.7	TZ07	NP0K-4.7		ZT-5547	5TCCB-V47
C48	62	500				22R5Q62				
C49	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C50	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68
C51	680		CC222Y5Y681M	SI680	D6-681	TP50	GP2K-681		UC-5368	5GA-T68

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA BENDIX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C52	680		CC22Y5Y681M	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C53	680		CC22Y5Y681M	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C54	.047	200	267068-473	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C55	82	500				22R5Q82				
C56A,B	4000		267053-403	BPD-3X004	DD3-403	DK078	832-004	DCD-534	5HK-2D4	
	4000									
C57	68		CC13S2L680K	SI68	D6-680	TP32	GP1K-680	UC-5468	5GA-Q68	
C58	3000		CC26Z5Y302M	BPD-003	DD-302	K076	801-003	DC-523	5HK-D3	
C59	1000		267072-102	BPD-001	DD-102	K069	801-002	DC-522	5HK-D2	
C60A	2200		#274291-1	#PA-359	D8-222	K073	801-0022	DC-5222	5HK-D22	
B	10000				DD-103	K082	811-01	DC-511	5HK-S1	
C61	2200		267073-223	BPD-0022	DD-223	K073	801-0022	DC-5222	5HK-D22	
C62	4700		267073-472	BPD-0047	DD-472	K079	801-0047	DC-5247	5HK-D47	
C63	.047	200	267056-473	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C64	.5	400	267056-474	P488-.5		CUB4P5		PT405	4TM-P5	
C65	.22	400	267036-224	P488-.22		CUB4P22		PT4022	4TM-P22	
C66	.033	400	267036-333	P488-033		CUB4S33		PT4133	4TM-S33	
C67	680		CC22Y5Y681M	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C68	1000	500	CM24B102M	1468-001		IR5D1		MCB251	MS-21	
C69	.047	200	267056-473	P288-047	DF-503	PJ2S47		PT4147	2TM-S47	
C70	680		CC22Y5Y681M	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C71	680		CC22Y5Y681M	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C72	.01	400	267036-103	P488-01	D8-103	CUB4S1	GP2-333-103	PT4S1	4TM-S1	
C73	.1	200	267056-104	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C74	680		CC22Y5Y681M	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C75	.01	400	267036-103	P488-01	D6-103	CUB4S1	GP2-333-103	PT4U	4TM-S1	
C76	220		CC22Y5Y221M	SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C77	.1	200	267056-104	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C78	.0047	600	267060-472	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C79	.0047	600	267060-472	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C80	.047	600	267036-473	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C81	.047	400	267056-473	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C82	2700	500	CM24B272K			IR5D27				
C83	1000	500	CM24B102K	1468-001		IR5D1		MCB251	MS-21	
C84	1000	500	CM24B102K	1468-001		IR5D1		MCB251	MS-21	
C85	.033	600	267055-333	P688-033		CUB6S33		PT6133	6TM-S33	
C86	.047	600	267055-473	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C87	.0033	400	267056-334	P488-0033	D6-333	CUB4D33		PT4233	4TM-D33	
C88	.22	200	267036-224	P288-.22		PJ2P22		PT4022	2TM-P22	
C89	.001	400	267036-102	P488-001	DD-102	CUB4D1	801-001	PT421	4TM-D1	
C90	.001	400	267036-102	P488-001	DD-102	CUB4D1	801-001	PT421	4TM-D1	
C91	.0047	400	267059-472	P488-0047	D6-472	CUB4D47	GP2-333-473	PT4247	4TM-D47	
C92	1	200	267058-104	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C93	.01	400	267059-103	P488-01	D8-103	CUB4S1	GP2-333-103	PT4U	4TM-S1	
C94	.01	400	267059-103	P488-01	D6-103	CUB4S1	GP2-333-103	PT4U	4TM-S1	
C95	3900	500	CM24J392K	1468-004		IR5D39		MCB343	MS-24	
C96	430	500	CM22B431K			5R5T43				
C97	330	500	CM22B331K			5R5T33				
C98	470		CC22Y5Y471M	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C99	.1	600	267055-104	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C100	.047	400	267058-473	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C101	.047	400	267036-473	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C102	.47	200	267056-474	P288-47		PJ2P47		PT4047	2TM-P47	
C103	.5	400		P488-5		CUB4P5		PT405	4TM-P5	
C104	250	20000	267065-2							
C105	62	2000								
C106	1000		CC22Z5Z102P	SI1000	D6-102	TP52	GP2L-102	UC-531	5HK-D1	

♦ Items C60A, C60B, R63A, R63B are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA BENDIX PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1.5Meg	½	LH262037-3		RTV-496	F1-65	UF155L	Tone-Panel
B	500KΩ	½				R2-46	UR55-T254	† Volume tapped at 300KΩ-Rear
C	Switch					KB-1	US-28	Attach to RIB
R2A	100KΩ	½	LH262045-45		RTV-497	F1-31	UF15L	Brightness-Panel
B	1200Ω	½				R2-7	UR52L	†† Contrast-Rear
R3A	2Meg	½	LH262049-1		RTV-496	F1-67	UF26L	Vert. Hold-Panel
B	30KΩ	½				R2-28	UR54L	♦ Horiz. Hold-Rear
R4A	1Meg	½	OCH262025-28P	Q11-137	A47-1Meg-S	BX-69	U-54	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R4A
R5A	3Meg	½	OCH262025-27P	Q11-140	A47-3Meg-S	BX-84	U-59	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R5A
R6A	3Meg	½	OCH262025-27P	Q11-140	A47-3Meg-S	BX-84	U-59	Noise Gate
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R6A

† Universal Replacement (Mallory exact duplicate part no. UE1627S).
†† Universal Replacement (Mallory exact duplicate part no. UE1125).
♦ Universal Replacement (Mallory exact duplicate part no. UE1735).

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA BENDIX PART No	IRC PART No.	NOTES
R7	1Meg	½		BTS-1Meg	
R8	750KΩ	½		BTS-750K	
R9	470Ω	½		BTS-470	
R10	100KΩ	½		BTS-100K	
R11	10KΩ	½		BTS-10K	
R12	470KΩ	½		BTS-470K	
R13	10KΩ	½		BTS-10K	
R14	1000Ω	½		BTS-1000	
R15	15KΩ	½		BTS-15K	
R16	9800Ω	½		BTS-9800	
R17	2200Ω	1		BTA-2200	
R18	2200Ω	1		BTA-2200	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA BENDIX PART No.	IRC PART No.	NOTES
R19	150KΩ	½		BTS-150K	
R20	100Ω	½		BTS-100	
R21	56Ω	½		BTS-56	
R22	150Ω	½	RC23A151K	BTS-150	
R23	1000Ω	1	RC24A102K	BTA-1000	
R24	220KΩ	½	RC23A224K	BTS-220K	
R25	5600Ω 5%	½	RC23A562J	BTS-5600 5%	
R26	360KΩ 5%	½	RC23A364J	BTS-360K 5%	
R27	680Ω 5%	½	RC23A680J	BTS-68 5%	
R28	33000Ω 5%	½	RC23A333J	BTS-3300 5%	
R29	220KΩ	½	RC23A224K	BTS-220K	
R30	100Ω	½	RC23A101K	BTS-100	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA BENDIX PART No	IRC PART No.	NOTES
R31	680Ω	½	RC23A681K	BTS-680	
R32	680Ω 5%	2		BTS-68 5%	Note 1
R33	3300Ω	3	RC25A332K	BTB-3300	
R34	10KΩ 5%	½	RC23A103J	BTS-10K 5%	
R35	82Ω	½	RC23A820K	BTS-82	
R36	22KΩ	½	RC23A223K	BTS-22K	
R37	33000Ω 5%	½	RC23A333J	BTS-3300 5%	
R38	150Ω	½	RC23A151K	BTS-150	
R39	2200Ω	1	RC24A222K	BTA-2200	
R40	100Ω	½	RC23A101K	BTS-100	
R41	820Ω	½	RC23A821K	BTS-820	
R42	12KΩ	½	RC23A123K	BTS-12K	
R43	220KΩ	½	RC23A224K	BTS-220K	
R44	2700Ω	1	RC24A272K	BTA-2700	
R45	5600Ω	½	RC23A562K	BTS-5600	
R46	2700Ω	1	RC24A272K	BTA-2700	
R47	330KΩ	½	RC23A334K	BTS-330K	
R48	33KΩ	½	RC23A333K	BTS-33K	
R49	150KΩ	½	RC23A154K	BTS-150K	
R50	68KΩ 5%	½	RC23A683J	BTS-68K 5%	
R51	51KΩ 5%	½	RC23A513J	BTS-51K 5%	
R52	1Meg 5%	½	RC23A105J	BTS-1Meg 5%	
R53	1Meg 5%	½	RC23A105J	BTS-1Meg 5%	
R54	4.7Meg 5%	½	RC23A475J	BTS-4.7Meg 5%	
R55	620KΩ 5%	½	RC23A624J	BTS-620K 5%	
R56	220Ω	½	RC23A221K	BTS-220	
R57	15KΩ	1	RC24A153K	BTA-15K	
R58	47KΩ	1	RC24A473K	BTA-47K	
R59	47KΩ	½	RC23A473K	BTS-47K	
R60	2700Ω	1	RC24A272K	BTA-2700	
R61	470Ω	½	RC23A471K	BTS-470	
R62	180Ω	½	RC23A181K	BTS-180	
R63A	47KΩ	½	#274291-1	BTS-47K	
B	47KΩ	½		BTS-47K	
R64	12KΩ	½	RC23A123K	BTS-12K	
R65	47KΩ	½	RC23A473K	BTS-47K	
R66	10Meg	½	RC23A106K	BTS-10Meg	
R67	10Ω	½	RC23A100K	BTS-10	
R68	1.2Meg	½	RC23A125K	BTS-1.2Meg	
R69	220KΩ	½	RC23A224K	BTS-220K	
R70	68KΩ	½	RC23A683K	BTS-68K	
R71	820KΩ 5%	½	RC23A824J	BTS-820K 5%	
R72	1Meg 5%	½	RC23A105J	BTS-1Meg 5%	
R73	150Ω	1	RC24A151K	BTA-150	
R74	56KΩ	2	RC25A563K	BTB-56K	
R75	3900Ω	1	RC24A392K	BTA-3900	
R76	390Ω	½	RC23A391K	BTS-390	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA BENDIX PART No.	IRC PART No.	NOTES
R77	47KΩ	½	RC23A473K	BTS-47K	
R78	330KΩ	½	RC23A334K	BTS-330K	
R79	2.2Meg	½	RC23A225K	BTS-2.2Meg	
R80	27KΩ	1	RC24A273K	BTA-27K	
R81	47KΩ	½	RC23A473K	BTS-47K	
R82	100KΩ	½	RC23A104K	BTS-100K	
R83	1.8Meg	½	RC23A185K	BTS-1.8Meg	
R84	8200Ω	½	RC23A822K	BTS-8200	
R85	4700Ω	½	RC23A472K	BTS-4700	
R86	22KΩ	½	RC23A223K	BTS-22K	
R87	3300Ω	½	RC23A332K	BTS-3300	
R88	39KΩ	½	RC23A393K	BTS-39K	
R89	15KΩ	½	RC23A153K	BTS-15K	
R90	10KΩ	½	RC23A103K	BTS-10K	
R91	470KΩ	½	RC23A474K	BTS-470K	
R92	33KΩ	½	RC23A333K	BTS-33K	
R93	3300Ω	½	RC23A332K	BTS-3300	
R94	33KΩ 5%	½	RC23A333J	BTS-33K 5%	
R95	2.2Meg	½	RC23A225K	BTS-2.2Meg	
R96	1000Ω	1	RC24A102K	BTA-1000	
R97	100Ω	½	RC23A101K	BTS-100	
R98	2200Ω	2	RC25A222K	BTB-2200	
R99	470KΩ	½	RC23A474K	BTS-470K	
R100	1000Ω	½		BTS-1000	
R101	1000Ω	½		BTS-1000	
R102	180KΩ	½	RC23A184K	BTS-180K	
R103	33KΩ	1	RC24A333K	BTA-33K	
R104	180KΩ	½	RC23A184K	BTS-180K	
R105	470KΩ	½	RC23A474K	BTS-470K	
R106	4.7Meg	½	RC23A475K	BTS-4.7Meg	
R107	39KΩ	½	RC23A393K	BTS-39K	
R108	1800Ω	½	RC23A182K	BTS-1800	
R109	5600Ω	1	RC24A562K	BTA-5600	
R110	68KΩ	½	RC23A683K	BTS-68K	
R111	330KΩ	½	RC23A334K	BTS-330K	
R112	5600Ω	½	RC23A562K	BTS-5600	
R113	10KΩ	½	RC23A103K	BTS-10K	
R114	100Ω	½	RC23A101K	BTS-100	
R115	470KΩ	½	RC23A474K	BTS-470K	
R116	100Ω	2	RC25A101K		
R117	22KΩ	2	RC25A223K	BTB-22K	
R118	22KΩ	2	RC25A223K	BTB-22K	
R119	47KΩ	½	RC23A473K	BTS-47K	
R120	6.8Ω	½	268000-068		
R121A	175Ω	7.5	268018-1		
B	175Ω	7.5			
R122	6.8Ω 5%	½	268000-068		
R123	220KΩ	1	RC24A224K	BTA-220K	

♦ Items R63A, R63B, C60A, and C60B are combined in one unit.
Note 1: Some versions may use a 47Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No	RATING PRI	RATING SEC 1	RATING SEC 2	REPLACEMENT DATA BENDIX PART No.	Stancor PART No	Merit PART No.	Triad PART No	RCA TYPE No	Halldorson PART No	Thordarson PART No
T1	117VAC @ 1.7A	725VCT @ .190ADC	5VAC @ 3A	265048-1	P-8170 ①		R-36A		P9706 ①	
		SEC 3	SEC 4	SEC 5						
		6.3VAC @ 1.2A	6.3VAC @ 7.6A							

① Drill new mounting holes.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA BENDIX PART No.	Halldorson PART No.	Merit PART No	RCA PART No.	Ram PART No.	Stancor TYPE No.	Thordarson PART No.	Triad PART No
T2	Horiz. Output Trans.	265088-4 ①	FB411 & RF800*③	HV0-9 & MWC-1*③	232T1*②	X110*	A-8233 & WC-5*③	FLY-24 & WC-20*③	D-35*②·
T3	Vert. Output Trans.	265072-8	Z1803	A-3036	204T3③	V309	A-8112	26851	A-92X③
T4A	Yoke-Horiz. (18MH)	265077-2③	DF805	MDF-73	222DI	Y70F17	DY-11A	Y-9	Y-22-1
B	Vert. (44MH)								
T5	Horiz. Lin. Coil (1.7-7.2MH)	259082-6	RF800③⑥	MWC-6④	21SR1	20LR15	WC-8	WC-18④	WC-12⑤
T6	Width Coil (1.7-6.2MH)	259114-1		MWC-6④	21RR1	20LR16	WC-8	WC-17⑦	WC-12⑤

① Includes coil, L36.
② Drill new mounting hole(s).
③ Include plug; capacitor C105; Resistors R100 and R101.
④ Enlarge mounting hole.
⑤ Connect to coded blue & green terms.
⑥ Connect to terms #3 & #4.
⑦ Do not use tap.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead
	6	9	9	10	13	7	9	10
	5	7	7	8	Note ⑩	6	7	8
	2	1	1	4	1	3	1	4
	1	3	3	3	2	4	3	3
	10	RF 800 Term #1	MWC-1 Red Term	2	9	WC-5 Or Term	WC-20 Term #3	2
	9	RF800 Term #2	MWC-1 Blk. Term	1	8	WC-5 Blk Term	WC-20 Term #4	1
Connect Width Coil Across →	2 & 1	RF800 Terms #3 & #4 1 & 3	MWC-1 Or. & Blk. Terms 1 & 3	4 & 3	2 & 1	WC-5 Blu. & Red Terms 3 & 4	WC-20 Terms #1 & #2 1 & 3	4 & 3
Special Notes →		⑨	⑨		⑩ ⑪	⑧	⑧	⑧

⑧ Jumper terms #9 & T".
⑨ If the picture is out of phase, reverse width coil primary or secondary.
⑩ Jumper terms #10 & #11.
⑪ Connect damper cathode to jumpered terms #10 & #11; Connect yoke (red lead) to term #6.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA BENDIX PART No.	Stancor PART No	Merit PART No	Triad PART No.	Halldorson PART No	Thordarson PART No	NOTES
T7	2.3KΩ	3.4Ω	265071-17	A-3823	A-3019	S-52	Z1006	26849	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA BENDIX PART No.	VIKING PART No	QUAM PART No	NOTES
SP1	4" X 6" 10"	PM PM	3.4Ω 3.4Ω	256030-3 256012-4 ①	46J6	46A1	① Used in models KM21E, KM21EU, KMT21E and KMT21EU

COILS (RF-IF)

ITEM No	USE	DC RES PRI	DC RES SEC	REPLACEMENT DATA BENDIX PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Matching Trans.	.6Ω	.6Ω					
L2	Ant. Matching Trans.	.6Ω	.8Ω					
L3	Ant. Shunt Coil							
L4	RF Trap							
L5	Ant. Shunt Coil							
L6	UHF Coil	0Ω						
L7	Ant. Coils	0Ω						
L8	Ant. Coil	0Ω						Channel 13
L9	Fil. Choke	0Ω						
L10	Neut. Coil	0Ω						
L11	RF Coil	0Ω						Channel 13
L12	RF Coils	0Ω						
L13	Mixer Grid Coils	0Ω						
L14	Mixer Grid Coil	0Ω						Channel 13
L15	Fil. Choke	0Ω						
L16	Osc. Coils	0Ω						
L17	Osc Coil	0Ω						Channel 5
L18	Osc Coil	0Ω						Channel 13
L19	RF Choke	1.4Ω						
L20	Feedback Coil	0Ω						
L21	Conv Plate	.2Ω						
L22	1st Video IF	.2Ω		259157-1			6217*	Includes 4L 25MC trap
L23	Sound Trap	0Ω		259146-1				
L24	2nd Video IF	.1Ω	.1Ω	259144-1	17-4522		6219	
L25	3rd Video IF	.1Ω	.1Ω	259145-1	17-4523		6219	
L26	Adj. Channel Pix. Trap	0Ω		259147-1				
L27	4th Video IF	.2Ω		259148-1				
L28	Fil Choke	0Ω		259149-1	19-1001		4604	L 5 Microhenries
L29	Series Peaking Coil	13Ω		259105-7	19-4250	TV-187	6173	270 Microhenries; Wound on 22KΩ resistor
L30	Shunt Peaking Coil	13Ω		259105-4	19-3250	TV-185	6181	270 Microhenries
L31	Shunt Peaking Coil	10Ω		259130-4	19-3250■	TV-185■	6181■	250 Microhenries; Wound on 220KΩ resistor
L32	4.5MC trap	.8Ω		259108-2	20-1004	TV-151	1469	
L33	Sound IF	1.9Ω	1.9Ω	259154-1	16-3445▲	TV-113	6203	
L34	Ratio Det.	5.5Ω	1.8ΩCT	259156-1	17-3497	TV-115	6205	Tertiary windings - .4Ω
L35	Horiz. Osc.	48Ω		259121-1	19-1676	TV-163	6210	
L36	RF Choke	8.2Ω			19-1005		4612	10 Microhenries; IRC part no. CL-1, Part of T-2

* Use only one winding.
■ Parallel with 220KΩ resistor.
▲ Drill mounting holes.

BENDIX MODELS KM21E, EU, KMT21E, EU, TB21E, EU, TM21E, EU (Ch. 714-15, 714-16)

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BENDIX PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	2/10A 250V	266164-5201		310125 (3AG-2/10A)		MDV 2/10	

CRYSTAL DIODES

ITEM No	ORIG TYPE	REPLACEMENT DATA			NOTES
		BENDIX PART No.	FEDERAL PART No.	SYLVANIA PART No.	
M2	1N60	1N60	1N64A	1N60 or 1N132	Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
M3	Dial Light		#47, Bayonet
M4	Tuner	258061-2	VHF - Chassis T14-15, T14-16
M5	Tuner	258061-3	UHF - Chassis T14-15 only
M6	Video Det.Assy.	259158-1	Includes M2, capacitors, coils and resistor
M7	Focus Magnet	274282-3	Includes centering device
M8	Ion Trap	274197-11	
B2	Trimmer Cap.	260009-11	Horiz. Drive (80-480MMF)
	Cabinet	255157-1	Models TM21E, TM21EU
	Cabinet	255157-2	Models TB21E, TB21EU
	Cabinet	255158-1	Models KM21E, KM21EU
	Cabinet	255181-1	Models KMT21E, KMT21EU
	Knob	269107-1	Contrast and horizontal hold - All models
	Knob	269108-1	Brightness and vertical hold - All models
	Knob	269109-1	On-off-volume - All models
	Knob	269110-1	Tune - All models
	Knob	269111-1	VHF Fine tuning - All models
	Knob	269112-1	VHF Channel Selector - UHF Prism-Models TM21EU, TB21EU, KM21EU, KMT21EU
	Knob	269113-1	UHF Channel Selector - Models TM21EU, TB21EU, KM21EU, KMT21EU
	Dial	269114-1	UHF - Models TM21EU, TB21EU, KM21EU, KMT21EU
	Knob	269115-1	Dummy (VHF Channel Selector) - Models TM21E, TB21E, KMT21E, KM21E
	Safety Glass	257609-6	All models
	Mask	269106-1	All models
	Name Plate	269075-1	Models KMT21E, KMT21EU

DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V18, V19, V20 and V21. Check M1 fuse. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T2, T4A, T5, T6, C100, C99, C101, C6, R119, R117, R116 and other associated components.	Check L35, C95, C96, C98, R108, R109, R111 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20 and V22. Check C98, C97, R112, R116, R117 and other associated components.

BLOOMING

Check by substitution V19, V20, V21 and V22. Check C98, R119, R117 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7, V8 and V13. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

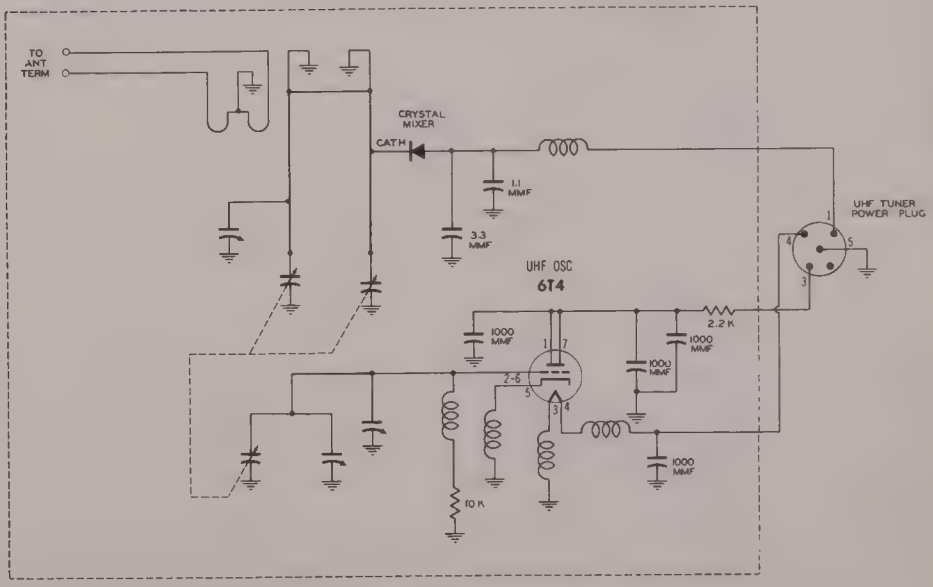
KEYSTONE EFFECT

Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



UHF TUNER USE WITH SOME VERSIONS

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UHF TUNER SCHEMATIC

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

The tuner portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

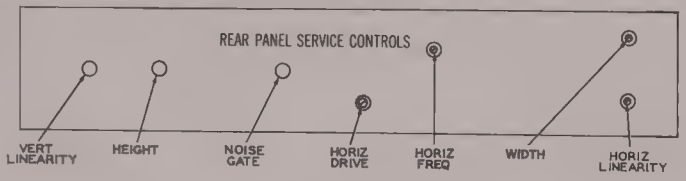
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove volume, tone, channel selector and fine tuning control knobs. Loosen 2 screws so safety glass and mask can be lowered to "fall" forward and out of set. Lift safety glass and mask out. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS - NOISE GATE CONTROL

Tune in the strongest station available.

Turn the contrast control to maximum.

With the noise gate control at maximum counter clockwise slowly turn the control clockwise until a horizontal shift is noted in the picture. Back off (counter clockwise) the control 1/8 turn.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L35) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L34) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

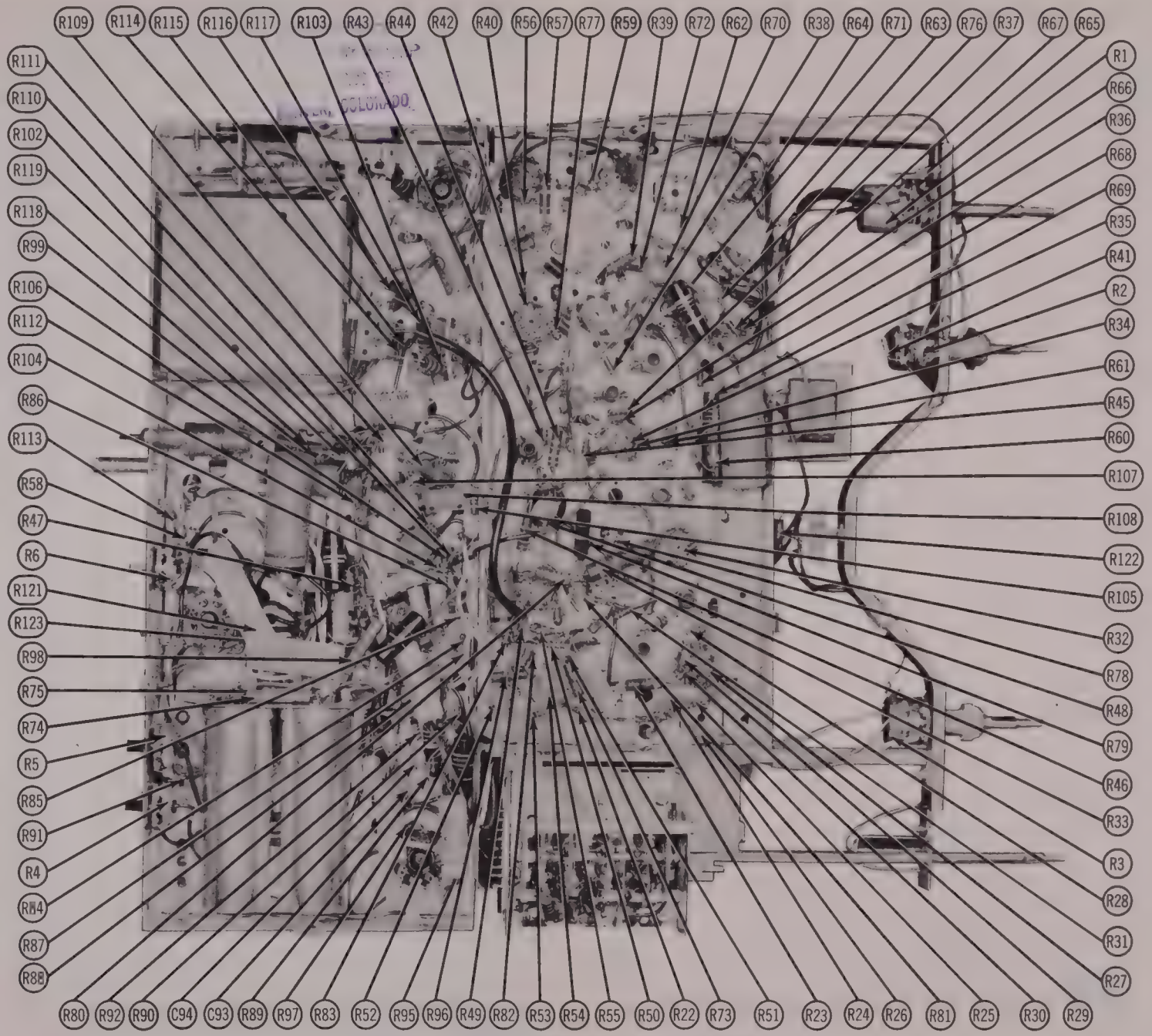
Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 8 push-on type control knobs from front panel.
2. Remove 6 metal screws. Remove rear cover.
3. Remove 2 metal screws from antenna bracket.
4. Disconnect picture tube socket, deflection yoke socket, HV lead and 2 speaker leads.
5. Remove 1 metal screw from yoke grounding lead.
6. Remove 5 chassis bolts. Remove chassis.
7. Remove 2 wood screws. Remove speaker.

PICTURE TUBE REMOVAL

1. Remove chassis. Gently lay cabinet face down.
2. Remove 2 bolts located in front of deflection yoke.
3. Remove yoke assembly.
4. Remove picture tube.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

CAPEHART
MODEL 1P55 (Ch. CR-148)

CAPEHART
MODEL 1P55 (Ch. CR-148)

TRADE NAME	Capehart Model 1P55 (Ch. CR-148)
MANUFACTURER	Capehart-Farnsworth Co., Div. of I. T. & T. Corp., Fort Wayne, Ind.
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Conv., 1U4 IF Amp., 1U5 Det-AVC-AF Amp., 3V4 Output
POWER SUPPLY RATINGS	105-125 Volts AC-DC (or) 3 Volts "A" Supply & 67.5 Volts "B" Supply .11 Amp. @ 117 Volts AC (or) 150MA @ 3 Volts DC & 8.5MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	540KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 6 (grid) of 1U4 (V2). Low side to B-.	455KC (400~ Mod.)	Tuning gang fully closed.	Across voice coil.	A1, A2	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2	"	High side to pin 6 (grid) of 1R5 (V1).	"	"	"	A3, A4	"
3	"	"	540KC	"	"	A5	"
4	"	"	1620KC	Tuning gang fully open.	"	A6	"
5		Loop	1500KC	Tune to 1500KC signal.	"	A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

CAPEHART
MODEL 1P55 (Ch. CR-148)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CAPEHART PART No.	STANDARD REPLACEMENT		
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	Det-AVC-AF Amp.	1U5	1U5	6BW	
V4	Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	CAPEHART PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	■50	150	750090B-46	AFH3-78		C057		FP307	TVL-3427
B	▲30	150							
C	150	25							
C2	.047	200	2246-4730	P288-047	DF-503	CUB2S47		PT4147	2TM-S47
C3	47		2240-006	SI47	D6-470		GP1K-470	UC-5447	5GA-Q47
C4	5000		450469A-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C5	5000		450469A-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C6	5000		450469A-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C7	5000		450469A-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C8	.22	200	2246-2240	P288-22		CUB2P22		PT4022	2TM-P22
C9A	150		♦453566A-1	♦PA-136-C	♦PC-165	G046	811-151	UC-5315	
B	2000					K072	801-002	DC-522	
C	10000					K082	811-01	DC-511	♦DP-1
D	150					G046	811-151	UC-5315	
E	5000					K080	811-005	DC-525	
C10	.0047	600	2248-4720	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47
C11	20000		450469A-10		DF-203	K085	821-02		5HK-S2

♦ Items C9A, C9B, C9C, C9D, C9E, R6A, R6B, R6C and R6D are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CAPEHART PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	750276A-7	Q13-137	A47-1Meg-Z	B-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWE-20	Not Req.	US-27	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CAPEHART PART No.	IRC PART No.	
R2	100KΩ	½	3230-224	BTS-100K	
R3	4700Ω	½	3229-472	BTS-4700	
R4	3.3Meg	½	3230-335	BTS-3.3Meg	
R5	3.3Meg	½	3230-335	BTS-3.3Meg	
R6A	10Meg	½	♦	BTS-10Meg	
B	4.7Meg	½		BTS-4.7Meg	
C	1Meg	½		BTS-1Meg	
D	3.3Meg	½		BTS-3.3Meg	

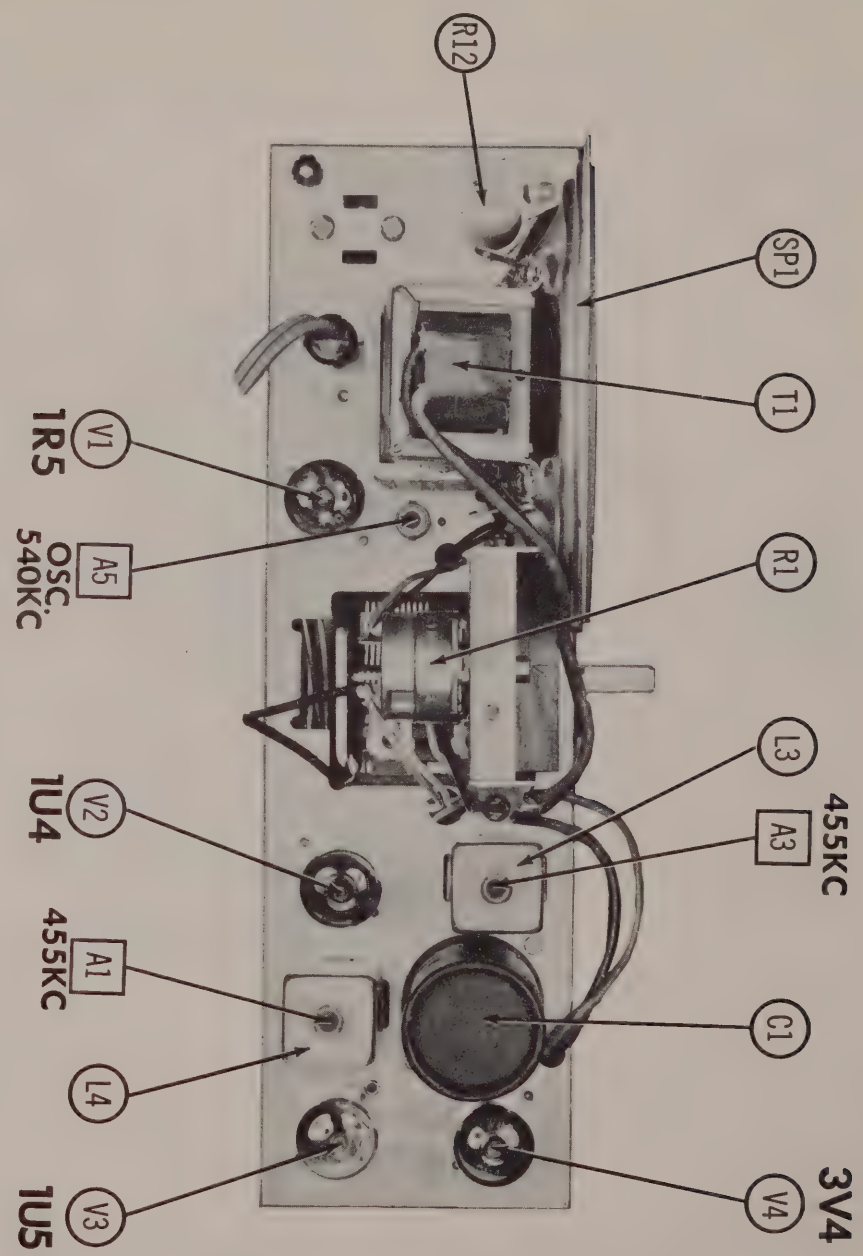
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CAPEHART PART No.	IRC PART No.	
R7	220Ω	½	3229-221	BTS-220	
R8	27Ω	½	3229-270	BTS-27	
R9	220KΩ	½	3230-224	BTS-220K	
R10	270Ω	½	3299-271	BTS-270	
R11	1200Ω	½	3229-122	BTS-1200	
R12A	2200Ω	7	650833A-3		
B	130Ω	3			
R13	33Ω	1	650101A-19		

♦ Items R6A, R6B, R6C, R6D, C9A, C9B, C9C, C9D and C9E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	CAPEHART PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	9.7KΩ	3.5Ω	Part of speaker	A-3329	A-2927 ①	S-11X		24S49	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	CAPEHART PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.5Ω	750520B-1	ST-113 Mod. P4-X	4A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	CAPEHART PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.6Ω		650831B-1				
L2	Osc. Coil	.7Ω	5.5Ω	650841C-1			71-Osc.	
L3	Input IF	15Ω	15Ω	750273A-1	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	15Ω	750273A-1	16-6758	BC-353	12-C2	

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	CAPEHART PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	
M1	.057A	650150D-5	1003A	RS65	6S75	75	5M4	

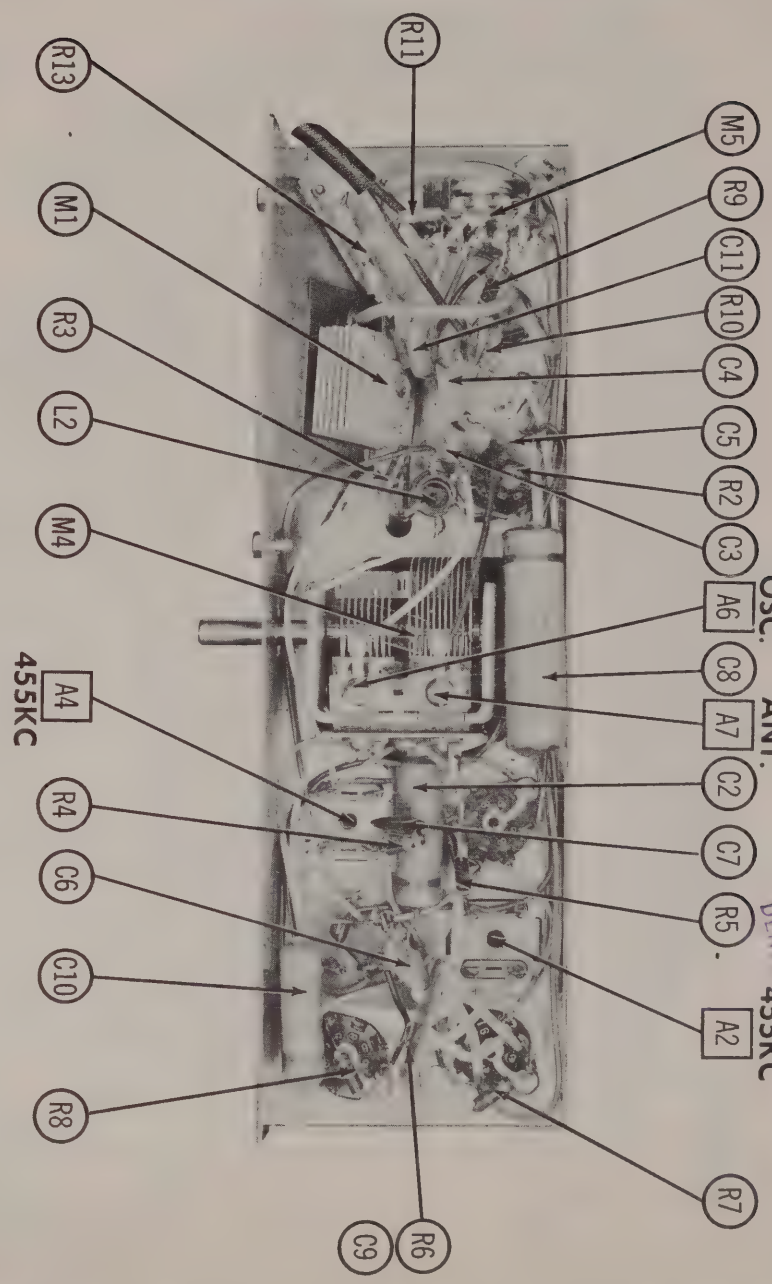
BATTERIES

ITEM No.	VOLTAGE	CAPEHART PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2 M3	3V "A" 67½V "B"		964	477		21R	P45		Connect 2 in series.

MISCELLANEOUS

ITEM No.	PART NAME	CAPEHART PART No.	NOTES
M4	Tuning Cap.	650834B-1	21-290MMF; 11-100MMF.
M5	Switch	650698A-2	Changeover
	Cabinet	451518A-1	Green
	Handle	650491A-7	For Green Cabinet
	Cabinet	451518A-2	Suntan
	Handle	650491A-8	For Suntan Cabinet
	Cabinet	451518A-3	Burgundy
	Handle	650491A-9	For Burgundy Cabinet
	Cabinet	451518A-4	Coral
	Handle	650491A-10	For Coral Cabinet
	Knob	750521B-1	Tuning
	Knob	452749C-9	On-Off-Volume

CHASSIS—BOTTOM VIEW



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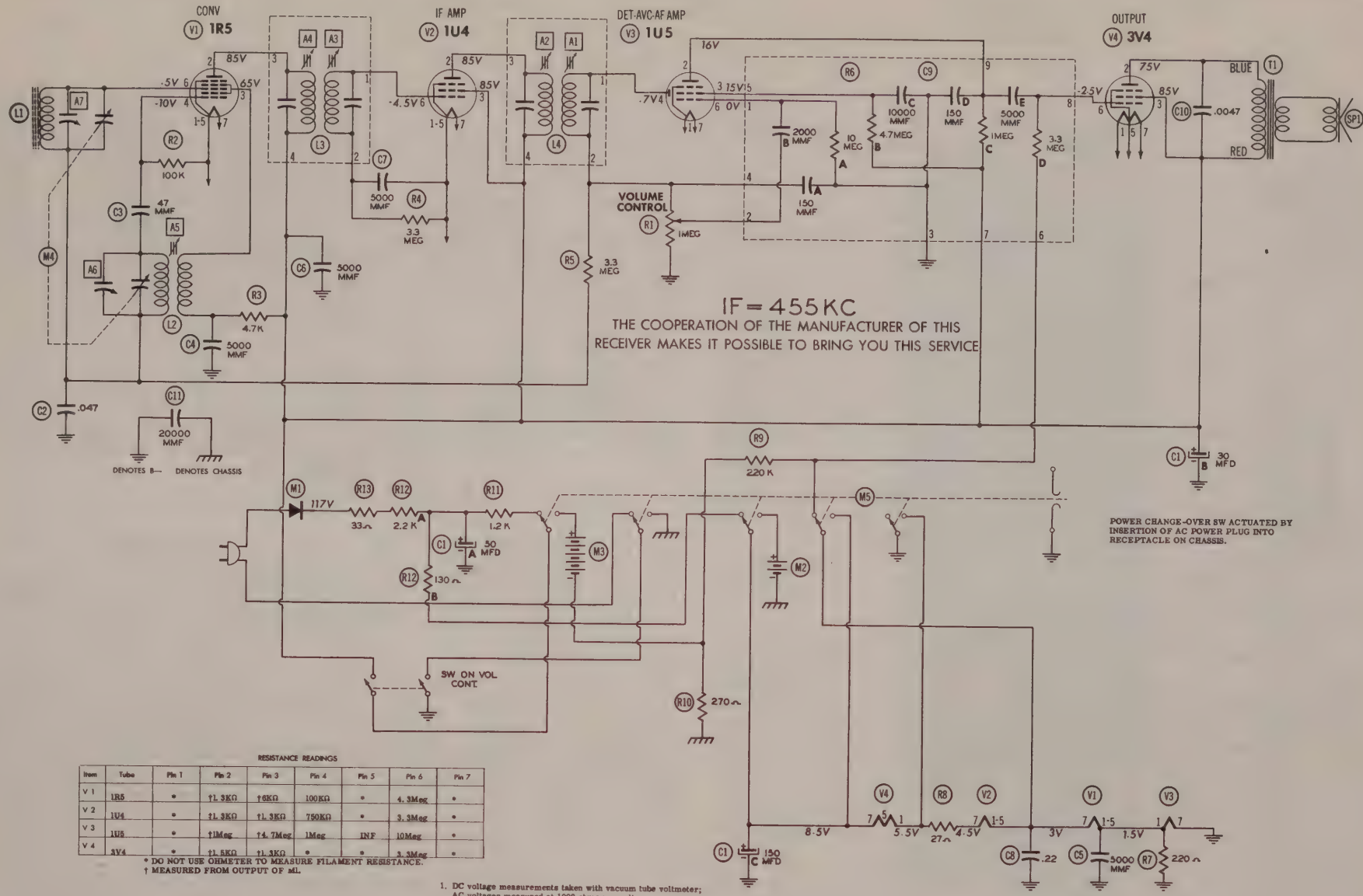

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†1.3KΩ	†6KΩ	100KΩ	*	4.3Meg	*
V 2	1U4	*	†1.3KΩ	†1.3KΩ	750KΩ	*	3.3Meg	*
V 3	1U5	*	†1Meg	†4.7Meg	1Meg	INF	10Meg	*
V 4	3V4	*	†1.5KΩ	†1.3KΩ	*	*	3.3Meg	*

* DO NOT USE OHMETER TO MEASURE FILAMENT RESISTANCE.
† MEASURED FROM OUTPUT OF MI.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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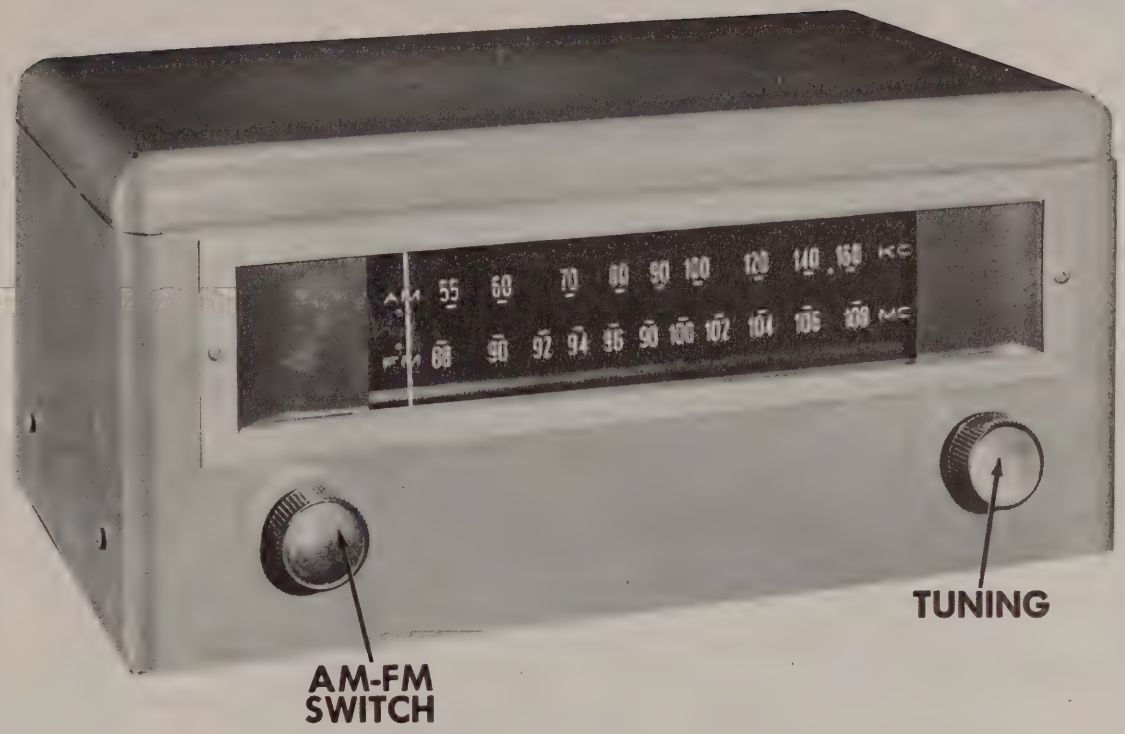
DAVID BOGEN
MODELS R640, R640G



DAVID BOGEN
MODELS R640, R640G

TRADE NAME	David Bogen Models R640, R640G	
MANUFACTURER	David Bogen Co., Inc., 29 Ninth Ave., New York 14, N.Y.	
TYPE SET	AC Operated AM-FM Superheterodyne Tuner For Custom Installation	
TUBES	Eleven	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING .38 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	535KC-1640KC	FREQ.MOD. 88MC-108MC

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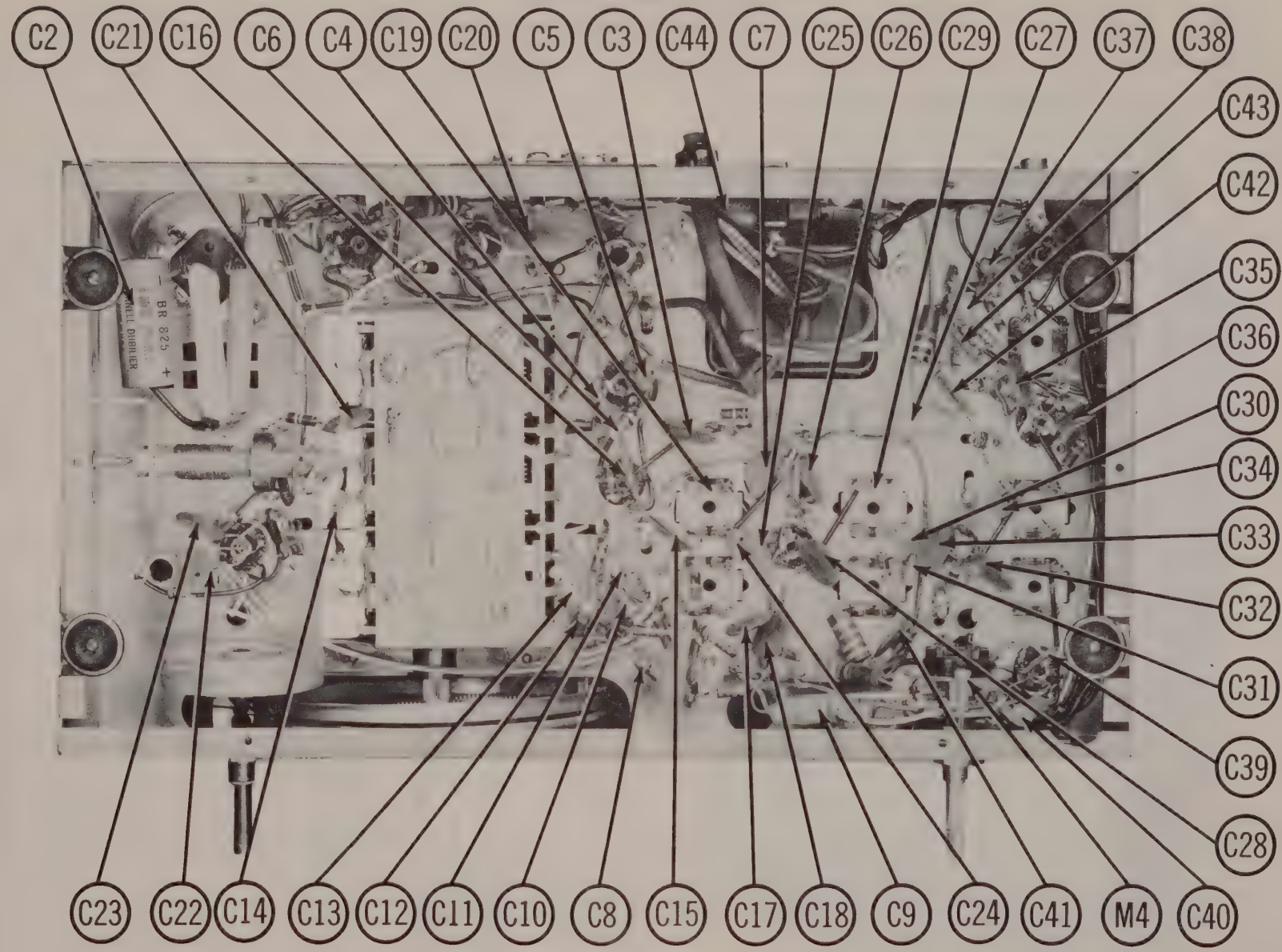
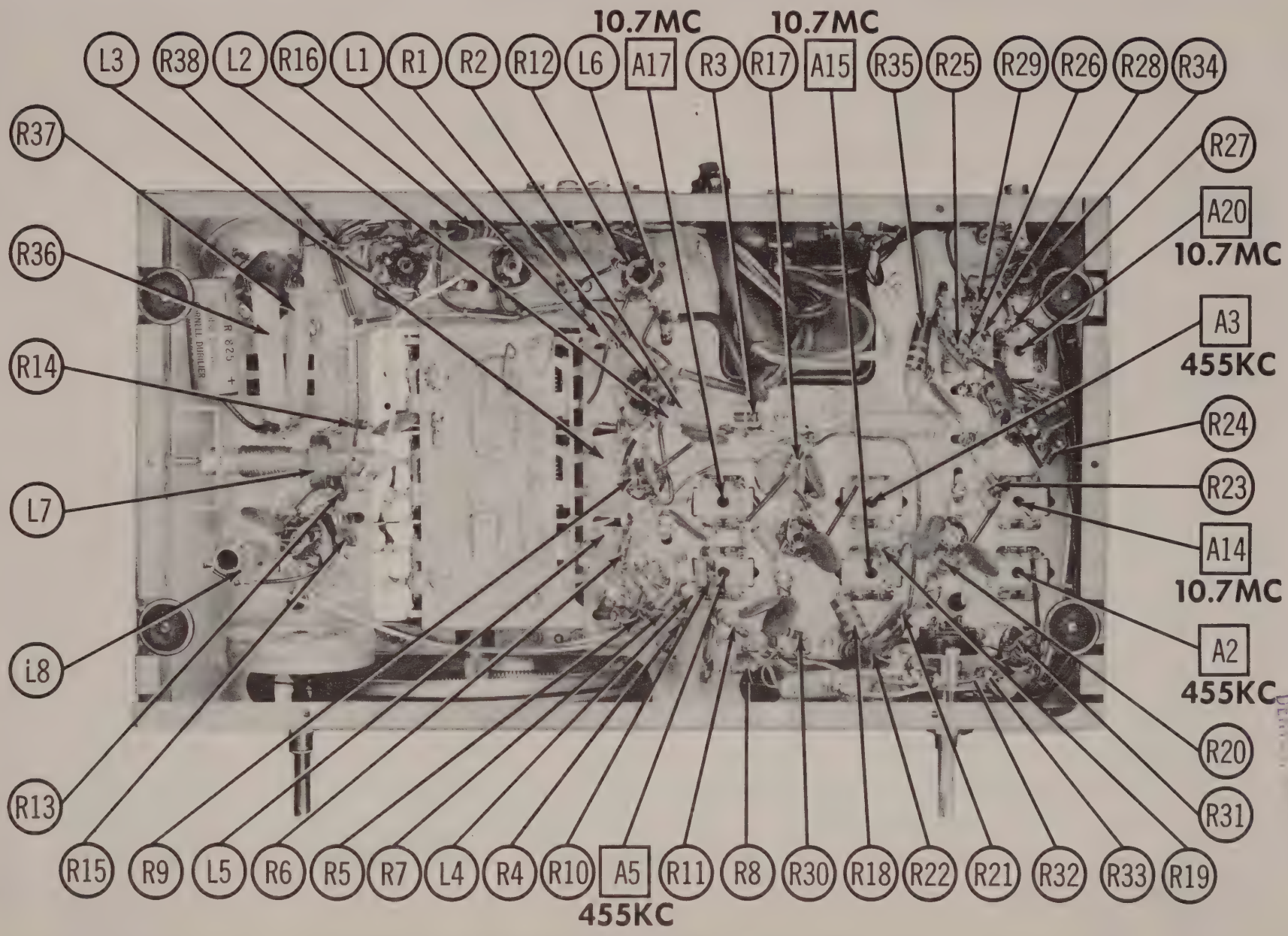


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

DAVID BOGEN
MODEL R640

PROPERTY OF
L. F. DUNN
3011 W.
DENVER, COLO.

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Allow 15 minute warm-up period for receiver and test equipment. With tuning gang fully closed set dial pointer to coincide with blue circles at low end of scale.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an an insulated alignment screwdriver for adjusting.
Use AC VTVM across audio output or power amplifier and output meter.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 6BE6 (V5). Low side to chassis.	455KC (400% Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4, A5, A6	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	200MMF	High side to AM antenna terminal lug. Low side to chassis.	600KC	"	Tune to 600KC signal	"	A7, A8, A9	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.	"	"	1500KC	"	Tune to 1500KC signal	"	A10, A11, A12	Adjust for maximum output. Repeat steps 2 and 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	Direct	High side to pin 6 (grid) of 6AB4 (V3). Low side to chassis. (shunt generator output cable with 50Ω resistor).	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point Ⓐ thru 100KΩ. Common to chassis.	A13, A14 A15, A16 A17, A18	Adjust for maximum deflection.
5.	"	High side to point A Low side to chassis.	"	"	"	DC probe to point Ⓑ. Common to chassis.	A19	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	"	"	"	"	"	DC probe thru 100KΩ to point Ⓒ. Common to chassis.	A20	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to pin 6 (grid) of 6AB4 (V3). Low side to chassis. (Shunt generator output cable with 50Ω resistor).	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓐ. Low side to chassis.	A13, A14 A15, A16 A17, A18	Adjust for curve of maximum amplitude and symmetry as in Fig. 1.
5.	"	High side to pin 1 (grid) of 6AU6 (V8). Low side to chassis.	"	"	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A20	Adjust for curve of maximum amplitude and symmetry as in Fig. 1.
6.	"	"	"	"	"	Vert. Amp. to point Ⓑ. Low side to chassis.	A19	Adjust so that 10.7MC occurs at center of cross over lines as in Fig. 2. SLIGHTLY retouch A20 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	300Ω Carbon Resistors	High side to FM antenna terminal lug thru 300Ω. Low side to chassis.	106MC	FM	Tune to 106MC signal	DC probe to point Ⓐ thru 100KΩ. Common to chassis.	A21, A22 A23	Adjust for maximum deflection in order given.
8.	"	"	90MC	"	Tune to 90MC signal	"	L5, L3, L1	If necessary, expand or compress L5, L3, L1 (in order given) for maximum deflection. Repeat step 7.

FIG. 1

FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		David Bogen PART No.	STANDARD REPLACEMENT		
V1	FM RF Amplifier	6CB6	6CB6	7CM	
V2	FM Osc.-FM AFC	12AT7	12AT7	9A	
V3	FM Mixer	6AB4	6AB4	5CE	
V4	AM RF Amplifier	6BA6	6BA6	7BK	
V5	AM Converter	6BE6	6BE6	7CH	
V6	1st. IF Amplifier	6BA6	6BA6	7BK	
V7	2nd. IF Amplifier	6BA6	6BA6	7BK	
V8	Limiter	6AU6	6AU6	7BK	
V9	Discriminator	6AL5	6AL5	6BT	
V10	AM Det.-AVC	6AL5	6AL5	6BT	
V11	Rectifier	6X4	6X4	5BS	

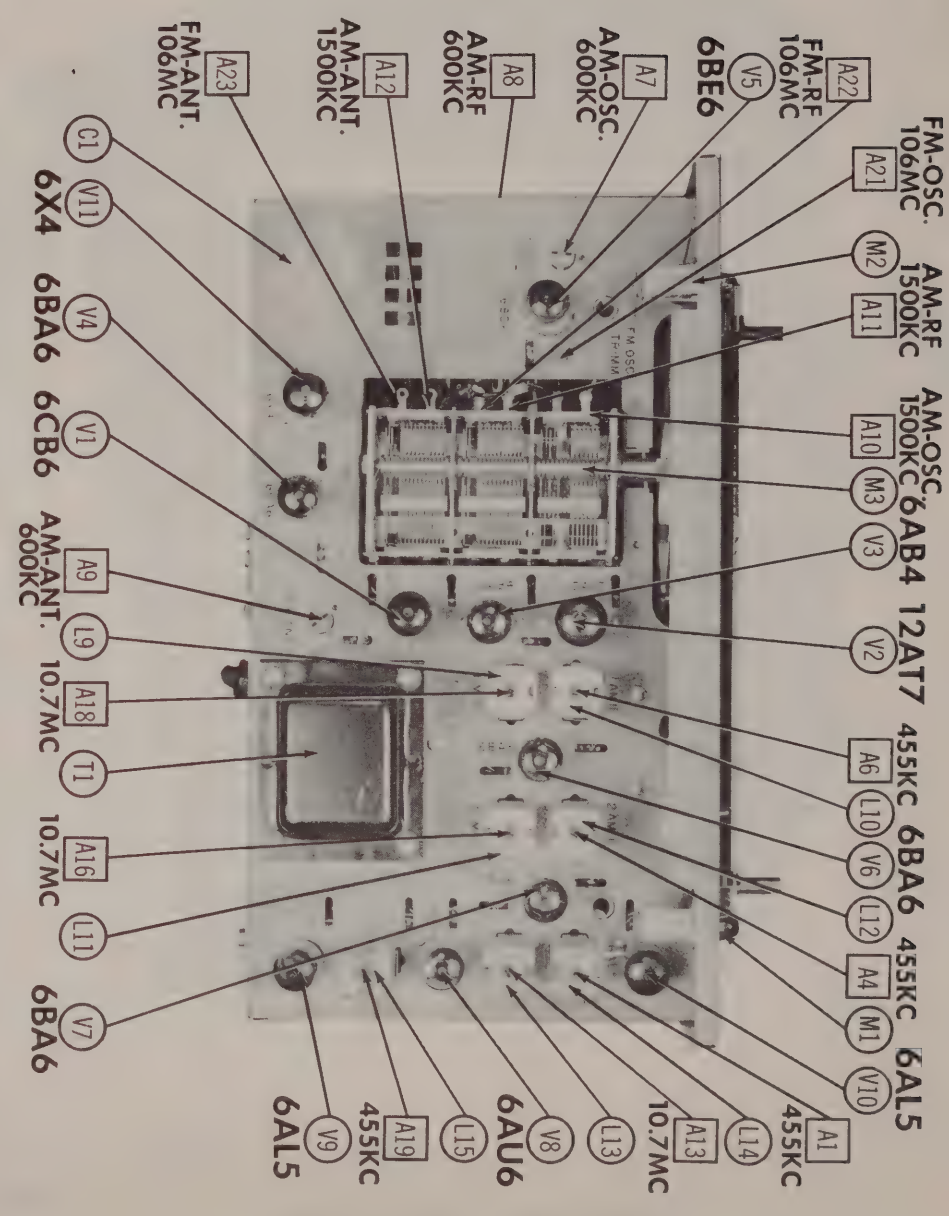
CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	▲20	450		AFH3-36		B050		FP237	TVL-4760
B	▲20	450							
C2	8	250		PRS250/8		BR825		TC51	TVA-1503
C3	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C4	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5GA-D1
C5	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5GA-D1
C6	12			SI12	D6-120	TP10	GP1K-120	UC-5412	5GA-Q12
C7	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C8	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1
C9	.05	200		P288-05	DF-503	CUB2S5		PT415	2TM-S5
C10	1000			SI1000	D6-102	TP52	GP2L-102 N330K-050	UC-521	5HK-D1
C11	5			SI5N330					
C12	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1
C13	100			SI100N330			N330M-101		
C14	1.2								
C15	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C16	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1
C17	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C18	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C19	2.4								
C20	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C21	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C22	47			SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47
C23	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C24	33			SI33	D6-330	TP27	GP1K-330	UC-5433	5GA-Q33
C25	150			SI150	D6-151	TP36	GP2K-151	UC-5315	5GA-T15
C26	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C27	.05	200		P288-05	DF-503	CUB2S5		PT415	
C28	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C29	2.4								
C30	33			SI33	D6-330	TP27	GP1K-330	UC-5433	5GA-Q33
C31	150			SI150	D6-151	TP36	GP2K-151	UC-5315	5GA-T15
C32	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C33	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C34	47			SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47
C35	10000			BPD- 01	DD-103	K082	811-01	DC-511	5HK-S1
C36	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C37	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1
C38	.001	200		P688-001	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1
C39A	100		♦C-325	♦PA-97-1	♦PC-50	♦111TM1	♦1403-01	UC-531	♦D-1
B	100							UC-531	
C40	.01	200		P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1
C41	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C42	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C43	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C44	.047	600		P688-047	DF-503	CUB6S47		PT6147	6TM-S47

♦ Items C39A, C39B and R31 are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA David Bogen PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R1	68Ω	½		BTS-68	
R2	1000Ω	½		BTS-1000	
R3	330Ω	½		BTS-330	
R4	220Ω	½		BTS-220	
R5	560Ω	½		BTS-560	
R6	10KΩ	½		BTS-10K	
R7	1000Ω	½		BTS-1000	
R8	220KΩ	½		BTS-220K	
R9	470Ω	½		BTS-470	
R10	1000Ω	½		BTS-1000	
R11	330Ω	½		BTS-330	
R12	100KΩ	½		BTS-100K	
R13	100KΩ	½		BTS-100K	
R14	100KΩ	½		BTS-100K	
R15	22KΩ	½		BTS-22K	
R16	3300Ω	2		BTB-3300	
R17	470KΩ	½		BTS-470K	
R18	3300Ω	2		BTB-3300	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA David Bogen PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R19	150KΩ	½		BTS-150K	
R20	68Ω	½		BTS-68	
R21	1000Ω	½		BTS-1000	
R22	330Ω	1		BTA-330	
R23	100KΩ	½		BTS-100K	
R24	15KΩ	½		BTS-15K	
R25	33KΩ	½		BTS-33K	
R26	47KΩ	½		BTS-47K	
R27	100KΩ	½		BTS-100K	
R28	100KΩ	½		BTS-100K	
R29	22KΩ	½		BTS-22K	
R30	3.3Meg	½		BTS-3.3Meg	
R31	47KΩ	½	♦	BTS-47K	
R32	3.3Meg	½		BTS-3.3Meg	
R33	220KΩ	½		BTS-220K	
R34	3.3Meg	½		BTS-3.3Meg	
R35	330Ω	1		BTS-330	
R36	500Ω	7			
R37	1000Ω	7		1 3/4A-1000	
R38	68Ω	½		BTS-68	

♦ Items R31, C39A and C39B are combined ineone unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA David Bogen PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ② .38A	456VCT .055ADC	6.3VAC ② 3.7A		T380	PM-8419	P-3047		P9213	

① Tape 6.3V Center Tap.

COILS (RF-IF)

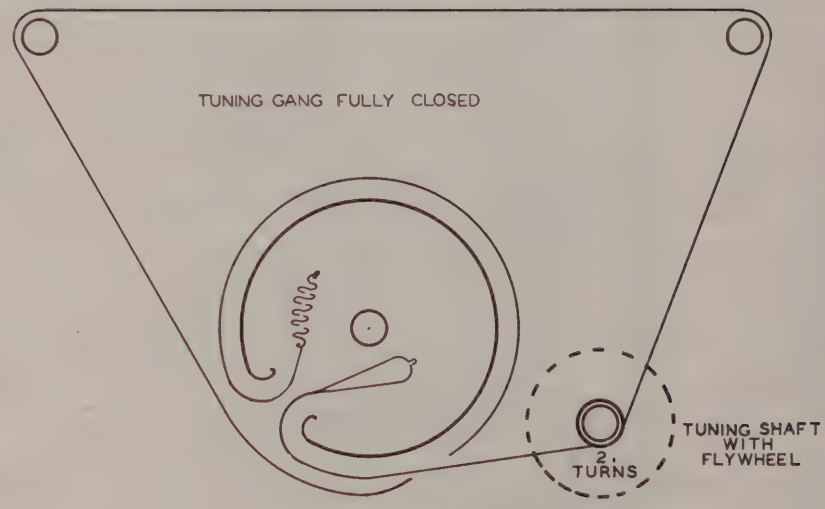
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA David Bogen PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω		U-402				Tapped
L2	RF Choke	3Ω		U-507	19-1003		4608	3.3 Microhenries; IRC part no. CLA
L3	FM RF Coil	0Ω		U-401				
L4	RF Choke	.8Ω		U-501	19-3001	TV-189	4602	1 Microhenry; IRC part no. CLA
L5	FM Osc. Coil	0Ω		U-403				Tapped
L6	AM Ant. Coil	.1Ω *	2.4Ω	U-304				
L7	AM RF Coil	72Ω	3.4Ω	U-301				
L8	AM Osc. Coil	2.2Ω		U-303	14-1060■	BC-381▲	71-Osc. ■	Tapped at 2Ω
L9	1st FM IF	.6Ω	.6Ω	H-294	16-3487	FM-254	1463	
L10	1st AM IF	17Ω	17Ω	H-297	16-6758	BC-352	12-C1	
L11	2nd FM IF	.7Ω	.7Ω	H-355	16-3487	FM-254	1463	
L12	2nd AM IF	17Ω	17Ω	H-297	16-6758	BC-353	12-C2	
L13	3rd FM IF	.7Ω	.7Ω	H-355	16-3487	FM-254	1463	
L14	3rd AM IF	17Ω	17Ω	H-297	16-6758	BC-353	12-C2	
L15	Discriminator	1.1Ω	.8ΩCT	H-295	17-3484♦	FM-253	1464	

* Tapped.
■ Use primary winding only.
▲ Use secondary winding only.
♦ Cut out chassis hole & drill mounting holes.

MISCELLANEOUS

ITEM No.	PART NAME	David Bogen PART No.	NOTES
M1	Dial Light		#47, Bayonet
M2	Dial Light		#47, Bayonet
M3	Tuning Cap.	C-619B	27-522MMF; 32-522MMF; 32-200MMF.
M4A	Switch		AM-FM
B	Switch		On-Off

DIAL CORD STRINGING



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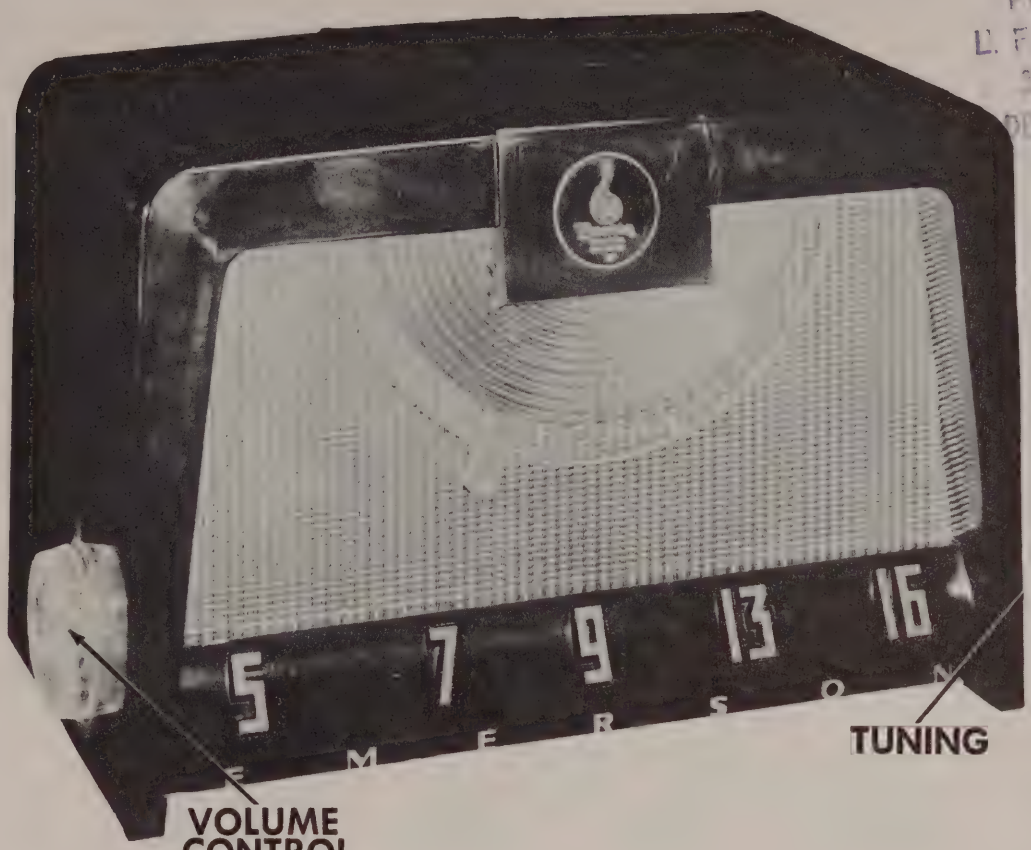
EMERSON
MODEL 810B (Ch. 120222-B)



EMERSON
MODEL 810B (Ch. 120222-B)

TRADE NAME	Emerson Model 810B (Ch. 120222B)
MANUFACTURER	Emerson Radio & Phono Corp., 111 Eighth Ave., New York, N. Y.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.005MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2 A3, A4	Adjust for maximum output.
2	Direct	Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3	"	"	1400KC	Tune to 1400KC signal.	"	A6	"

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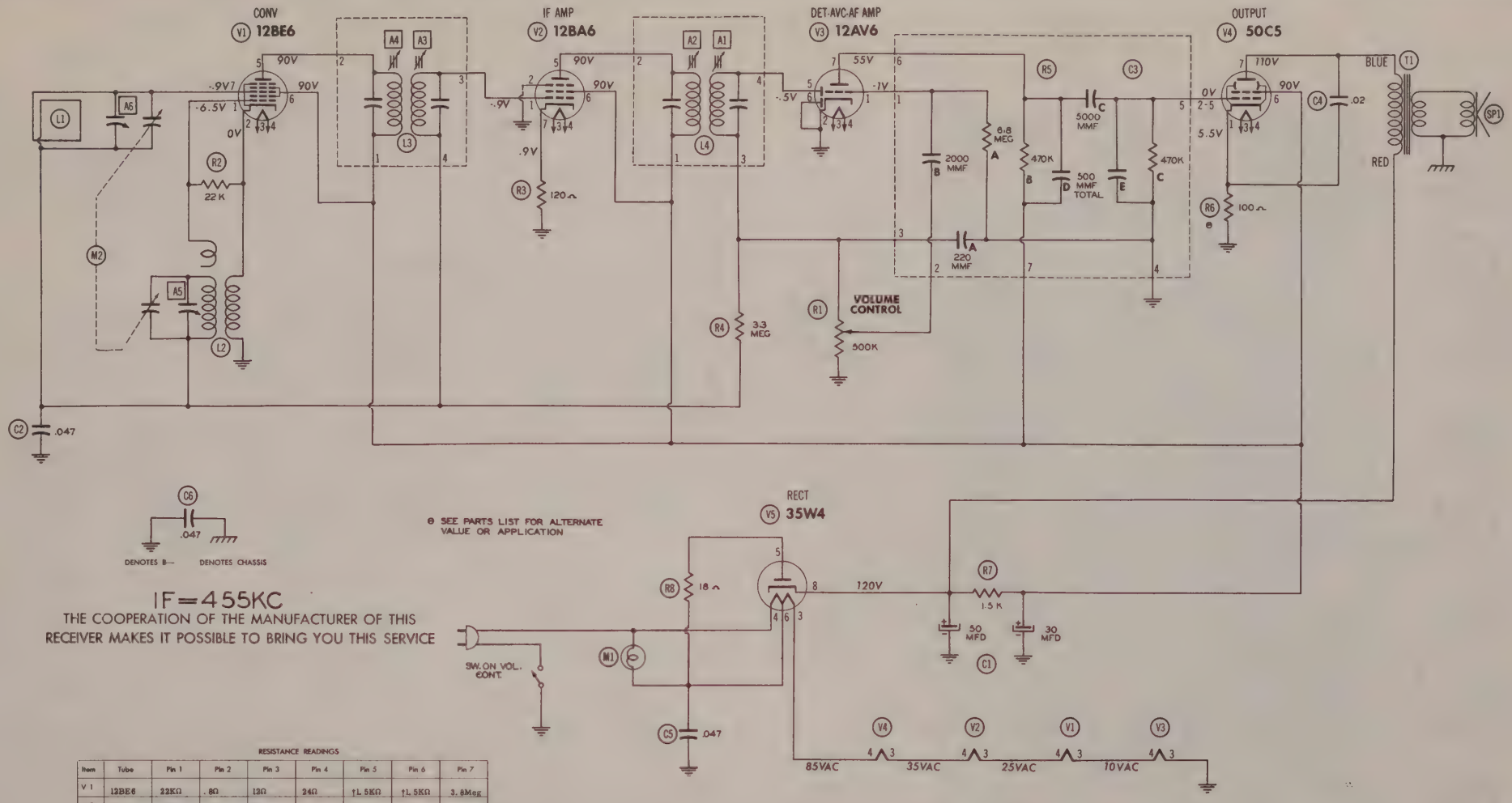

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	12Ω	24Ω	†1.5KΩ	†1.5KΩ	3.8Meg
V 2	12BA6	3.8Meg	0Ω	24Ω	36Ω	†1.5KΩ	†1.5KΩ	120Ω
V 3	12AV6	6.8Meg	0Ω	0Ω	12Ω	500KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	86Ω	470KΩ	†1.5KΩ	210Ω
V 5	35W4	INF	INF	86Ω	117Ω	128Ω	110Ω	100KΩ

† MEASURED FROM PIN #7 OF V5.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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FIRESTONE MODEL 4-B-74

PROPERTY OF
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DENV

FIRESTONE MODEL 4-B-74

FIRESTONE MODEL 4-B-74

TRADE NAME	Firestone Model 4-B-74 (Code 120-4-F241) (For 1954 Ford Automobile)
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Pkwy, Akron, Ohio
TYPE SET	Battery Operated Custom Built Automobile AM Superheterodyne Receiver
TUBES (Six)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 Det-AVC-AF Amp., 6V6GT Output, 6X5GT Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 5.4 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	538KC - 1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Attenuate generator output to maintain approximately 1.8 volts on output meter.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2 A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2	"	"	1600KC	"	"	A5	"
3	68MMFD	High side to antenna receptacle. Low side to chassis.	1400KC	Tune to 1400KC signal.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4	"	"	"	"	"	A7	" With radio installed in car and antenna fully extended, tune in a weak station near 1000KC and adjust A7 (antenna trimmer) for maximum volume.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FIRESTONE PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amp.	6BA6	6BA6	7CK	
V4	Det-AVC-AF Amp.	6AV6	6AV6	7BT	6AT6 used in some sets.
V5	Output	6V6GT	6V6GT	7S	
V6	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	■20	350	CE-86	AFH3-107		C080		FP330	TVL-3636
B	▲20	350							
C	20	50							
C2	100		CC101	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1
C3	.047	200	C503-2	P288-047	DF-503	PJ2S47		PT415	2TM-S47
C4	.006	600	C602-4	P688-006	D6-602	CUB6D6	GP2-333-602	PT626	6TM-D6
C5	.047	200	C503-2	P288-047	DF-503	PJ2S47		PT415	2TM-S47
C6	5		CC50	SI5	D6-050		GP1K-050	UC-555	5TCCU-Q5
C7	40		CC-400	SI40	D6-400		GP1K-400	UC-544	5GA-Q4
C8A	220		♦PC-151	♦PA-113-2	♦PC-151	♦116TM2	♦1408-02		♦DT-2
B	5000								
C	5000								
D	250								
E									
C9	5000		C502-2	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C10	.01	600	C103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1
C11	.47	100	C504-1	P185-5		PJ2P5		RF-480	HC-3
C12	.47	100	C504-1	P185-5		PJ2P5		RF-480	HC-3
C13	.008	1600	C802-16	P1688-008		CUB16D8		PT1628	MB-D8

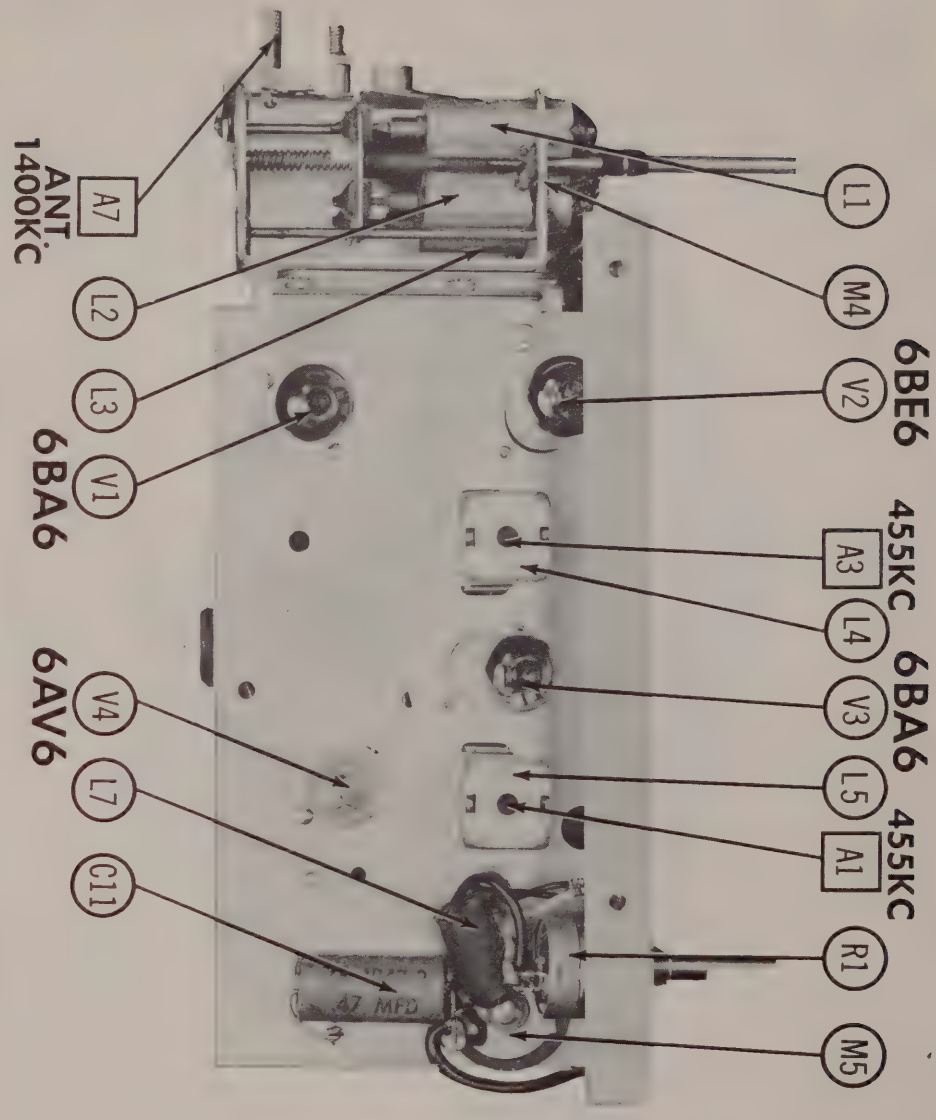
♦ Items C8A, C8B, C8C, C8D, C8E, R9A, R9B, and R9C are combined in one unit.
When replacing items individually, items C8D and C8E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	750KΩ with 20KΩ stop.	1	RV-651	Q13-137	A47-750K-Z	B-69-8	U-51	Volume - Note
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

Note: Connect a 20KΩ resistor in series with the right hand terminal of the control & the lead connecting to the same terminal of the original control (Control viewed from shaft end, terminals down.)

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R2	470KΩ	½	R474	BTS-470K	
R3	150Ω	½		BTS-150	Note 1
R4	150KΩ	2	R154	BTS-150K	
R5	47KΩ	½	R473	BTS-47K	
R6	3300Ω	½		BTS-3300	Note 2
R7	6800Ω	2	R682-2	BTB-6800	
R8	2.2Meg	½	R225	BTS-2.2Meg	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA FIRESTONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R9A	6.8Meg	½	*	BTS-6.8Meg	
B	470KΩ	½	*	BTS-470K	
C	470KΩ	½		BTS-470K	
R10	330Ω	½	R33L	BTS-330	
R11	1000Ω	1	R102-1	BTA-1000	
R12	82Ω	½	R820	BTS-82	
R13	82Ω	½	R820	BTS-82	

* Items R9A, R9B, R9C, C8A, C8B, C8C, C8D and C8E are combined in one unit.
Note 1: Some versions may use a 220Ω in the application.
Note 2: Some versions may use a 1000Ω in this application.

TRANSFORMER (VIBRATOR)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA FIRESTONE PART No.	Stancor PART No	Merit PART No.	Triad PART No	Halldorson PART No	Thordarson PART No.
T1	6.3VCT @ 2A	430VCT @ 46A			TV-100		P-2971	V-16X	V380X	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA FIRESTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	5.2KΩ	3.5Ω	TO-4602	A-3877	A-2930	S-3X	Z11D7	24S51	

SPEAKER

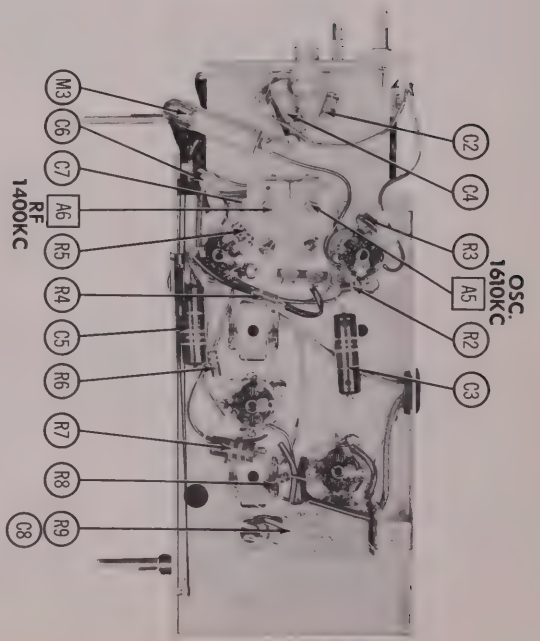
ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP	REPLACEMENT DATA FIRESTONE PART No	JENSEN PART No.	QUAM PART No.	NOTES
SP1	6" X 9"	PM	3.5Ω	PM-901	6T-812 Mod. P69-S	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	12Ω						Part of Tuner assembly
L2	RF Coil	12Ω						Part of Tuner assembly
L3	Osc. Coil	.5Ω	2.6Ω					Part of Tuner assembly
L4	Input IF	15Ω	15Ω	1655-16*	16-6758	BC-352	12-C1	
L5	Output IF	15Ω	15Ω	1655-16*	16-6758	BC-353	12-C2	
L6	Vib. Hash Choke	9Ω		L202A		BC-457		
L7	Fil. Choke	9Ω		L303			5221	

* Some versions may use alternate part #1655-6 in this application.

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				FIRESTONE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6.3	115v	V-83	5301	859	5301	

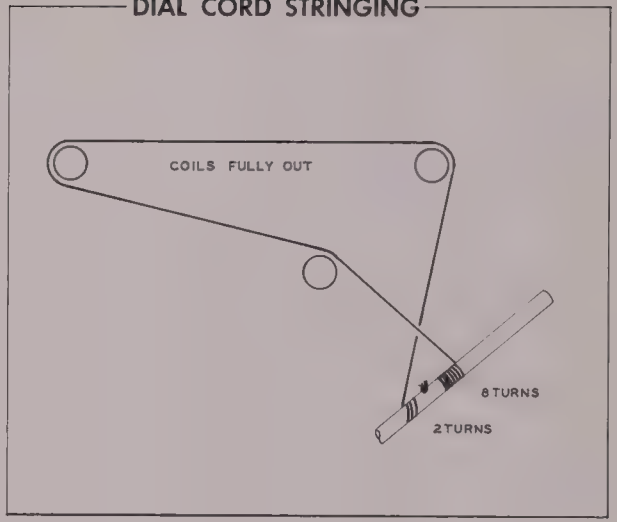
FUSES

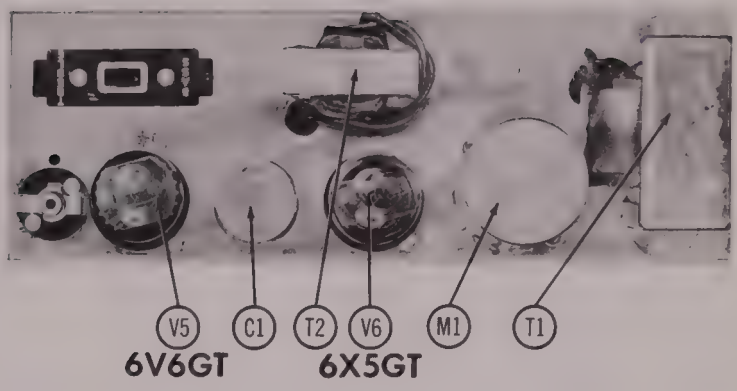
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			FIRESTONE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A	A300	FH356	307014 (14A-SFE)	155014	SFE14	HDI

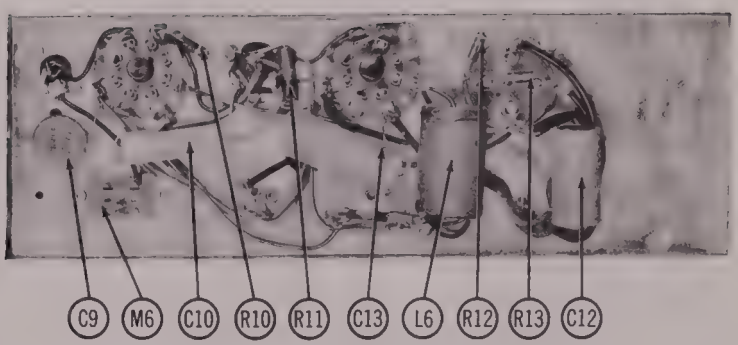
MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M3	Dial Light	T47	Bayonet, #47
M4	Tuner	PT-500D	Permeability-Includes L1, L2, L3
M5	Spark Plate	X215	
M6	Switch	SS-1	
	Case	H430	Less Cover
	Cover	H241	Front
	Knob	H310E	Volume-On-Off
	Knob	H310P	Tuning
	Dial Scale	D241	
	Pointer	PS241	

DIAL CORD STRINGING




V5
C1
T2
V6
M1
T1
6V6GT
6X5GT


C9
M6
C10
R10
R11
C13
L6
R12
R13
C12

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FIRESTONE PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amp.	6BA6	6BA6	7CK	
V4	Det-AVC-AF Amp.	6AV6	6AV6	7BT	6AT6 used in some sets.
V5	Output	6V6GT	6V6GT	7S	
V6	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	■20	350	CE-86	AFH3-107		C080		FP330	TVL-3636
B	▲20	350							
C	20	50							
C2	100		CC101	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1
C3	.047	200	C503-2	P288-047	DF-503	PJ2S47		PT415	2TM-S47
C4	.006	600	C602-4	P688-006	D6-602	CUB6D6	GP2-333-602	PT626	6TM-D6
C5	.047	200	C503-2	P288-047	DF-503	PJ2S47		PT415	2TM-S47
C6	5		CC50	SI5	D6-050		GP1K-050	UC-555	5TCCU-Q5
C7	40		CC-400	SI40	D6-400		GP1K-400	UC-544	5GA-Q4
C8A	220								
B	5000								
C	5000		♦PC-151	♦PA-113-2	♦PC-151	♦116TM2	♦1408-02		♦DT-2
D	250								
E									
C9	5000		C502-2	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C10	.01	600	C103-6	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1
C11	.47	100	C504-1	P185-5		PJ2P5		RF-480	HC-3
C12	.47	100	C504-1	P185-5		PJ2P5		RF-480	HC-3
C13	.008	1600	C802-16	P1688-008		CUB16D8		PT1628	MB-D8

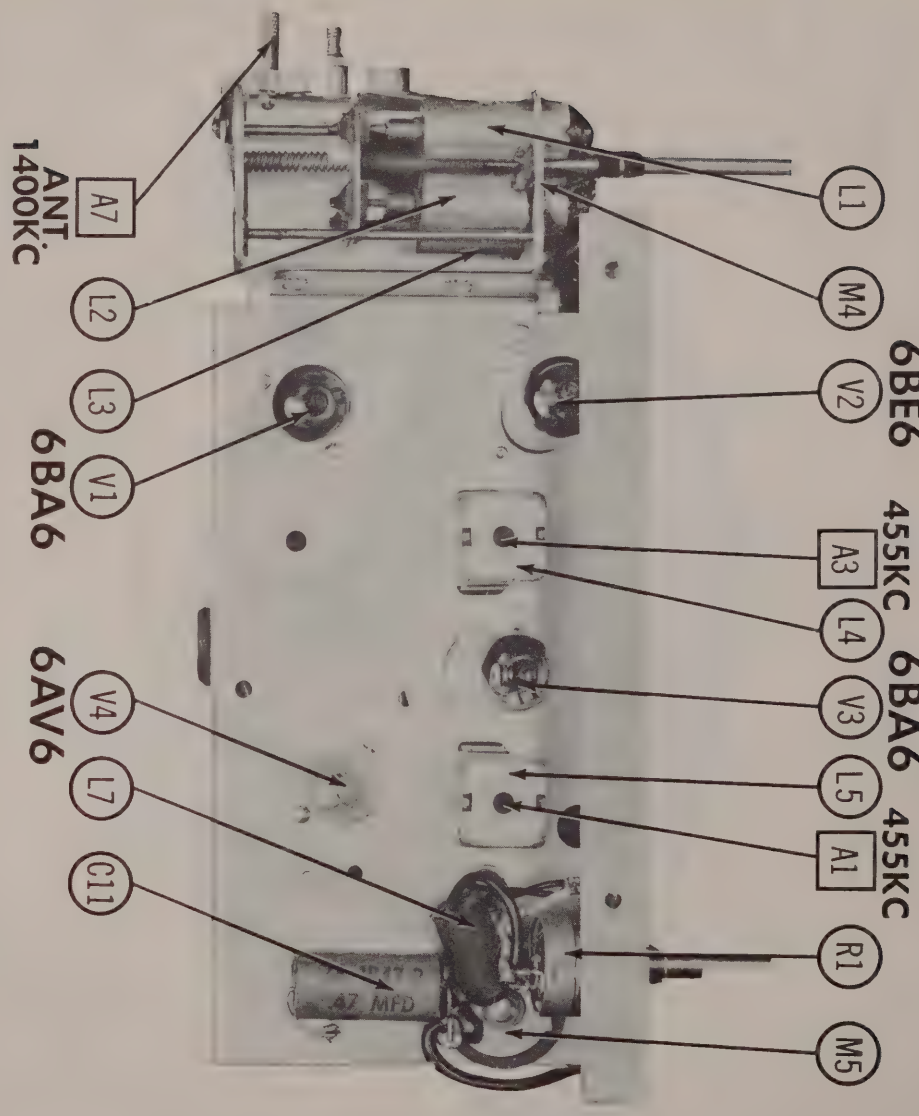
♦ Items C8A, C8B, C8C, C8D, C8E, R9A, R9B, and R9C are combined in one unit.
When replacing items individually, items C8D and C8E should total 250MMF.

CONTROLS

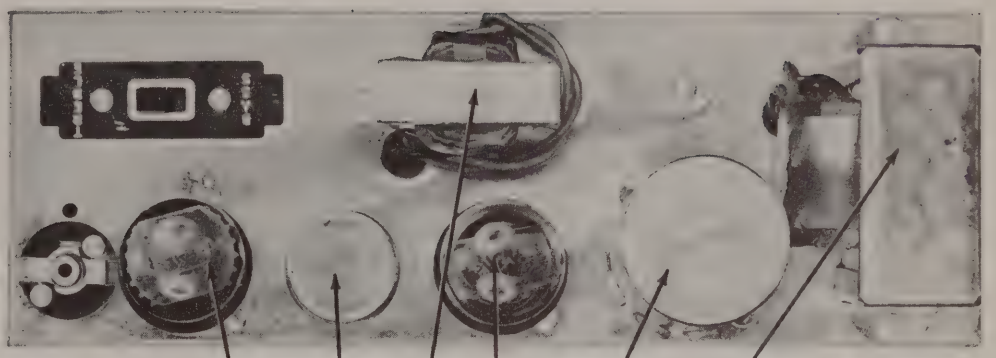
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	FIRESTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	750KΩ with 20KΩ stop.	½	RV-651	Q13-137	A47-750K-Z	B-69-8	U-51	Volume - Note
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

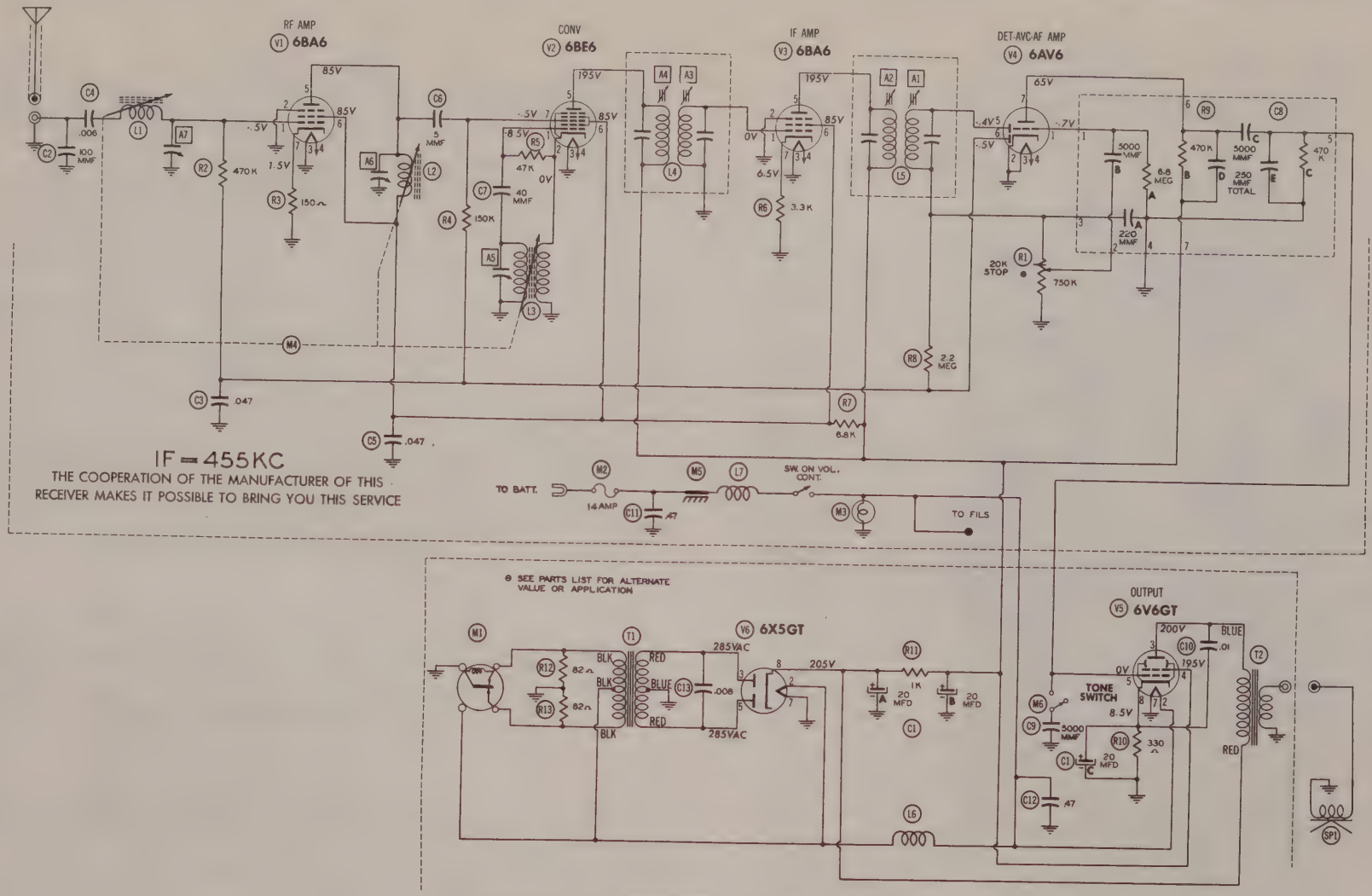
Note: Connect a 20KΩ resistor in series with the right hand terminal of the control & the lead connecting to the same terminal of the original control (Control viewed from shaft end, terminals down.)

CHASSIS—TOP VIEW



PROPERTY
L. F. E.
DENVER, COLO.





RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6BA6	3.6Meg	0Ω	0Ω	.1Ω	†7.8KΩ	†7.8KΩ	230Ω	
V 2	6BE6	47KΩ	.4Ω	0Ω	.1Ω	†1KΩ	†7.8KΩ	2.1Meg	
V 3	6BA6	1ΜΩ	0Ω	0Ω	.1Ω	†1KΩ	†7.8KΩ	3.5KΩ	
V 4	6AV6	6.8Meg	0Ω	0Ω	.1Ω	750KΩ	2Meg	†470KΩ	
V 5	6V6GT	INF	.1Ω	†385Ω	†1KΩ	470KΩ	INF	0Ω	330Ω
V 6	6X5GT	INF	.1Ω	340Ω	INF	340Ω	INF	0Ω	70KΩ

† MEASURED FROM PIN 8 OF V4.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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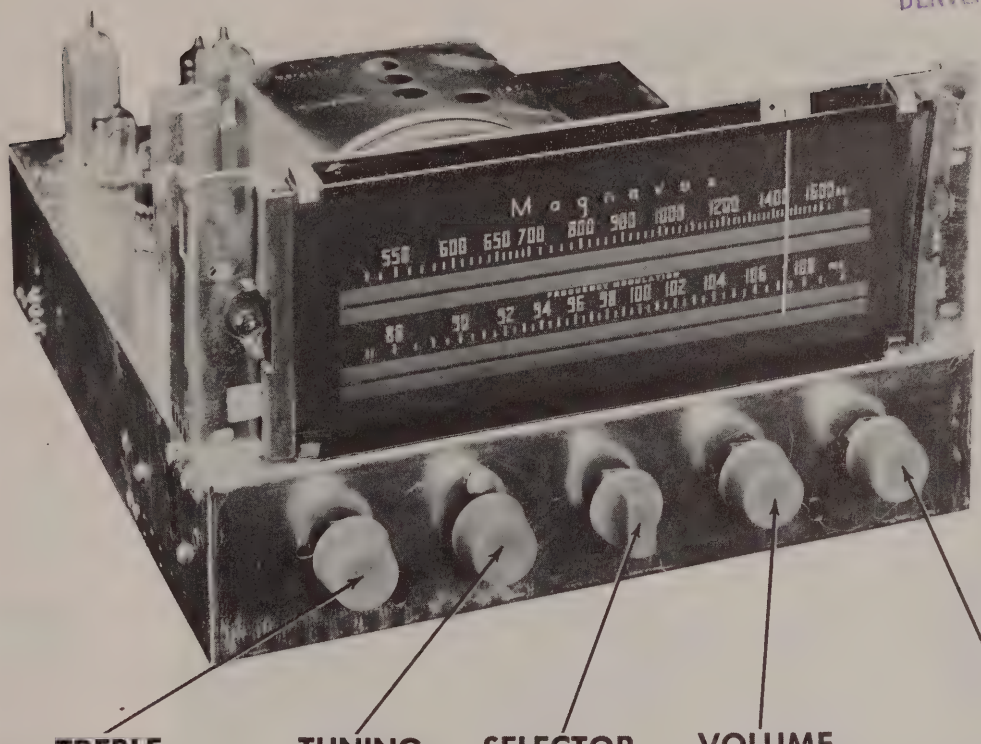
RETMA MEMBER

MAGNAVOX
CHASSIS CR330AA-1

PROPERTY OF
L. F. BLA[illegible]
3924 MEADE ST.
DENVER, COLORADO

MAGNAVOX
CHASSIS CR330AA-1



MAGNAVOX
CHASSIS CR330AA-1

TRADE NAME	Magnavox Chassis CR330AA-1
MANUFACTURER	Magnavox Co., 2131 Bueter Rd., Ft. Wayne, Indiana
TYPE SET	AM-FM Superheterodyne Tuner
TUBES (Seven)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 AM FM IF Amp., 6BA6 FM IF Amp. -AM Det., 6AU6 Limiter, 6AL5 Discriminator, 6AV6 AF Amp. -AVC Clamper
POWER REQUIREMENTS	Approx. 280 Volts DC (B+) & 6.3 Volts AC (Filaments)
TUNING RANGE--BROADCAST	540KC - 1620KC FREQ. MOD. FM 88MC - 108MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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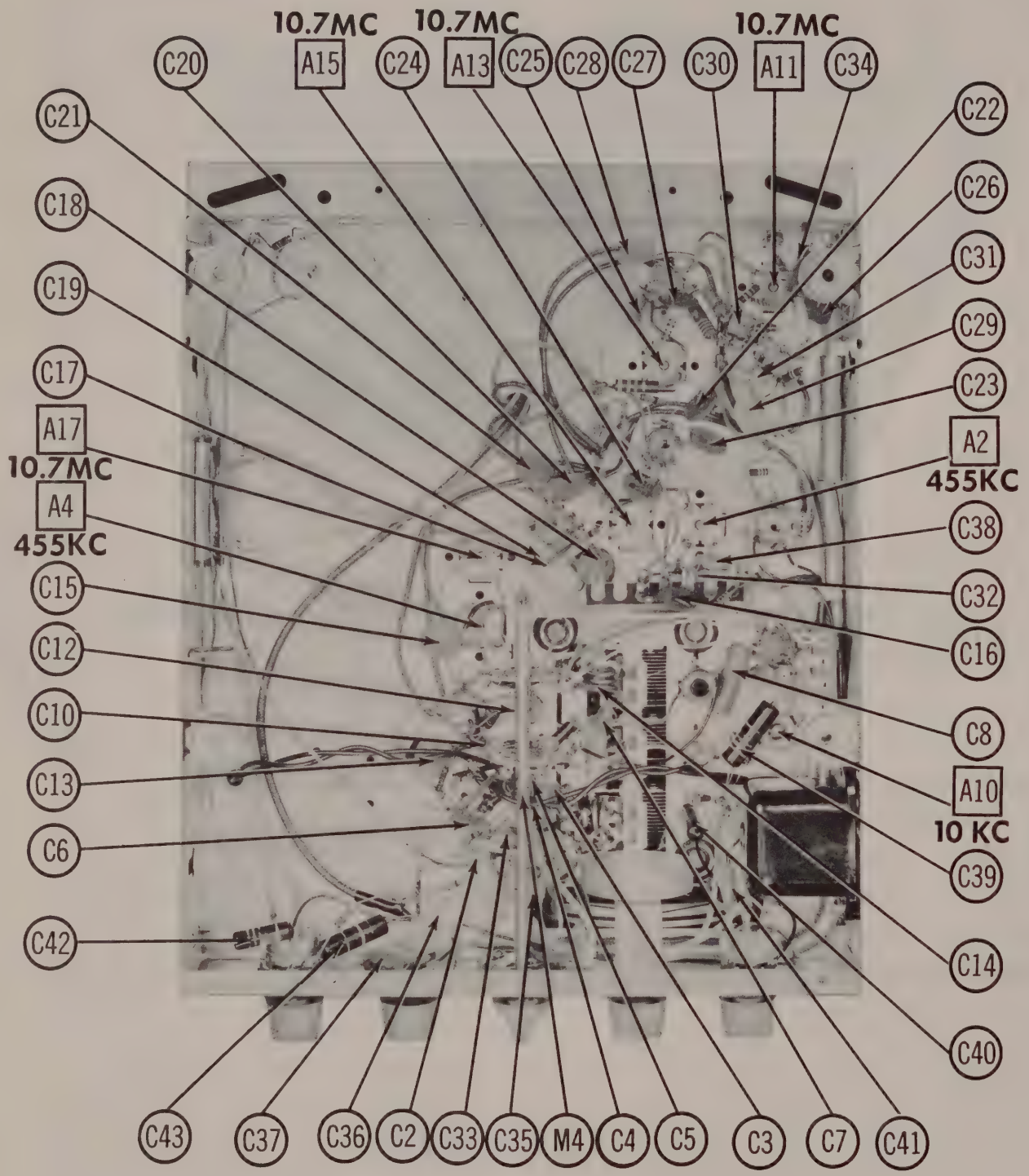
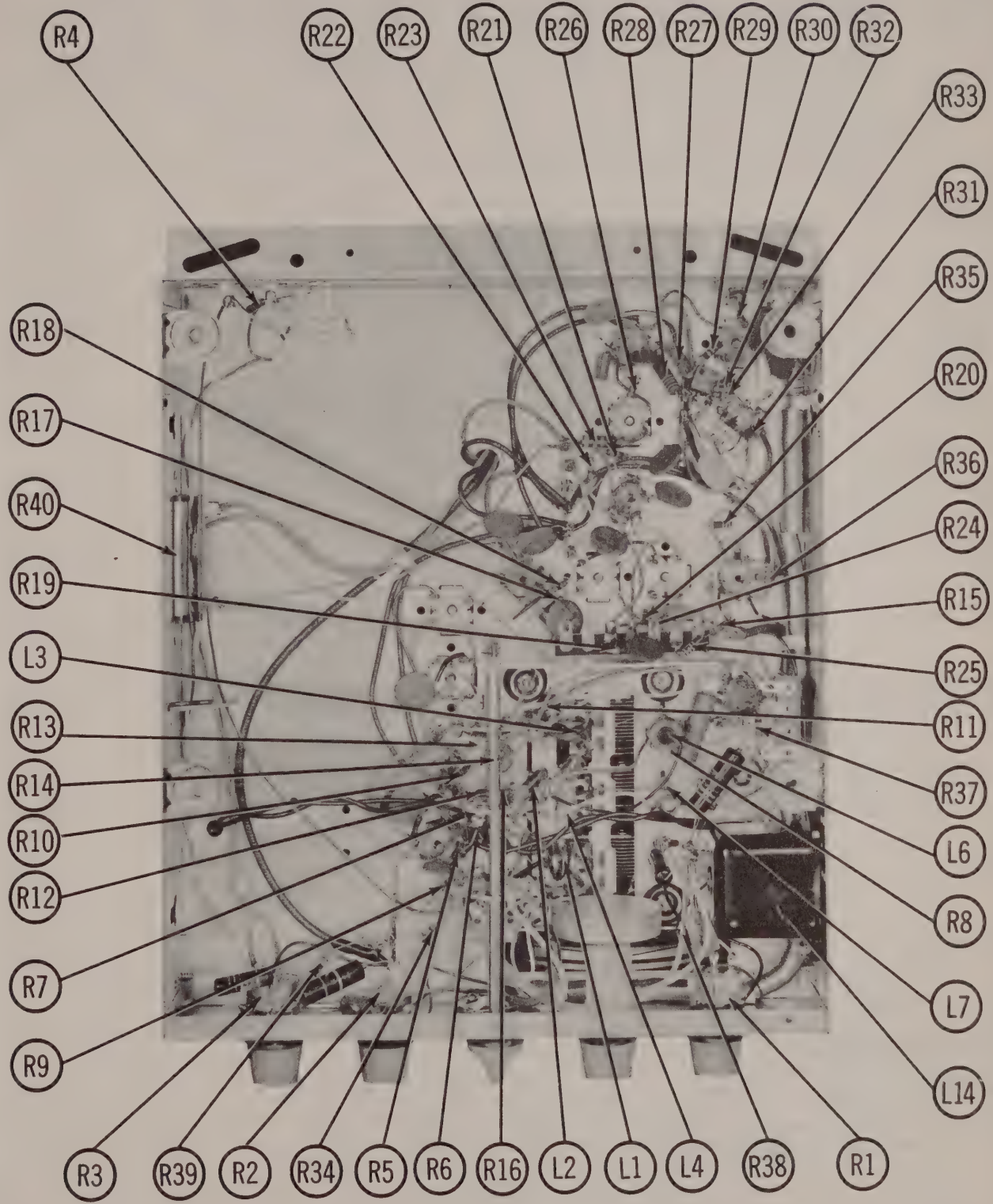


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3024 BLAKE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Allow a 15 minute warm-up period for tuner and equipment.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Disconnect loop antenna from terminals "H" and "L.
Turn treble control to sharp tune.
Turn bass control fully clockwise.
The AM IF adjustments, A1 thru A4, (Step 1) may be performed visually as follows:
Connect high side to 455KC sweep generator (use 20KC swp.) thru .01MFD capacitor to pin 7 (grid) of 6BE6 (V2). Low side to chassis.
Connect high side of vertical amp. of scope thru a 1Meg resistor to point (A). Low side to chassis.
Adjust A1 thru A4 for maximum amplitude response similar to Fig. 1.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.01MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400∿ Mod.)	BDCST	1000KC	Across voice coil.	A1, A2 A3, A4	Adjust for maximum output.
2	Direct	High side to "H". Low side to "L".	1400KC	"	1400KC	"	A5, A6	Adjust in order given for maximum output.
3	"	"	600KC	"	600KC	"	A7, A8	"
4		Loop	1400KC	"	Tune to 1400KC signal.	"	A9	Replace chassis in cabinet and connect loop antenna to terminals "H" and "L". Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

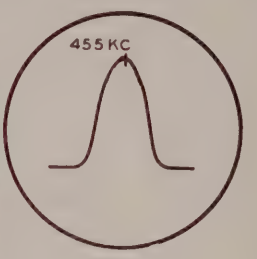


FIG. 1

10KC FILTER ALIGNMENT

Turn treble control maximum clockwise (full range).

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
5	Direct	Connect audio oscillator across phono pickup socket. (Rear Panel)	10KC	Phono	Any	Across voice coil.	A10	Adjust for minimum output.

ALTERNATE 10KC FILTER ALIGNMENT

Switch band selector to broadcast and tune to a point between 2 stations on adjacent channels. Choose 2 stations having the same power output.
If a whistle is heard, adjust A10 to minimize whistle.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

If in steps 6 & 7 the signal generator does not have sufficient output to give usable indication on VTVM, perform step 8. Leave signal generator connected as in step 8 and then adjust A11 & A12 as outlined in step 6 & 7.
CAUTION - Do not attempt to repeak IF stages with signal generator connected to converter grid. Each stage should be peaked individually as in steps 8, 9 & 10.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	10.775MC (Unmod.)	FM	Point of non-interference.	DC probe to point (C) common to chassis.	A11, A12	Adjust for maximum deflection.
7	"	"	10.7MC	"	"	"	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Switch generator to 10.625MC and note deflection on VTVM. Increase generator freq. to 10.775MC and again note deflection on VTVM. If voltages at both frequencies are not within 10% of each other (and of opposite polarity) repeat steps 6 & 7.
8	.01MFD in series with 1KΩ carbon.	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	"	"	Tuning gang fully closed.	DC probe thru 1Meg to point (B) Common to chassis.	A13, A14	Attenuate generator output to maintain 3 volts at VTVM. Adjust for maximum deflection.
9	"	High side to pin 1 (grid) of 6BA6 (V3). Low side to chassis.	"	"	"	"	A15, A16	"
10	"	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	"	"	"	"	A17, A18	"

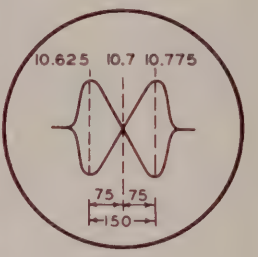


FIG. 2

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference.	Vert. amp. thru 100KΩ to point (C). Low side to chassis.	A11, A12	Adjust A11 so that 10.7MC occurs at center of crossover lines as in Fig. 2. Adjust A12 for amplitude and straightness of lines. If necessary, retouch A11 & A12 for response similar to Fig. 2 with 10.625MC, 10.7MC & 10.775MC markers as shown.
7	.01MFD in series with 1KΩ carbon resistor.	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	"	"	Tuning gang fully open.	Vert. amp. thru 1Meg to point (B). Low side to chassis.	A13, A14	Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
8	"	High side to pin 1 (grid) of 6BA6 (V3). Low side to chassis.	"	"	"	"	A15, A16	"
9	"	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	"	"	"	"	A17, A18	Adjust for curve of maximum amplitude and symmetry similar to Fig. 3. Continue alignment with step 11.

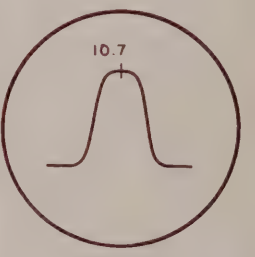


FIG. 3

FM RF ALIGNMENT

Attenuate generator output to maintain 3 volts at VTVM. Connect short jumper from one FM antenna terminal to ground.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
11	300Ω carbon resistor.	High side thru 300Ω to ungrounded FM antenna terminal. Low side to chassis.	107MC	FM	107MC	DC probe thru 1Meg to point (B). Common to chassis.	A19	Adjust for maximum deflection.
12	"	"	"	"	"	"	A20, A21	Adjust in order given for maximum deflection. If necessary, rock tuning gang thru 107MC signal when adjusting A20.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MAGNAVOX PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	1st. AM FM IF Amp.	6BA6	6BA6	7BK	
V4	2nd. FM IF Amp.-AM Det.-AVC	6BA6	6BA6	7BK	
V5	FM Limiter	6AU6	6AU6	7BK	
V6	Discriminator	6AL5	6AL5	6BT	
V7	AF Amplifier-AVC Clamper	6AV6	6AV6	7BT	

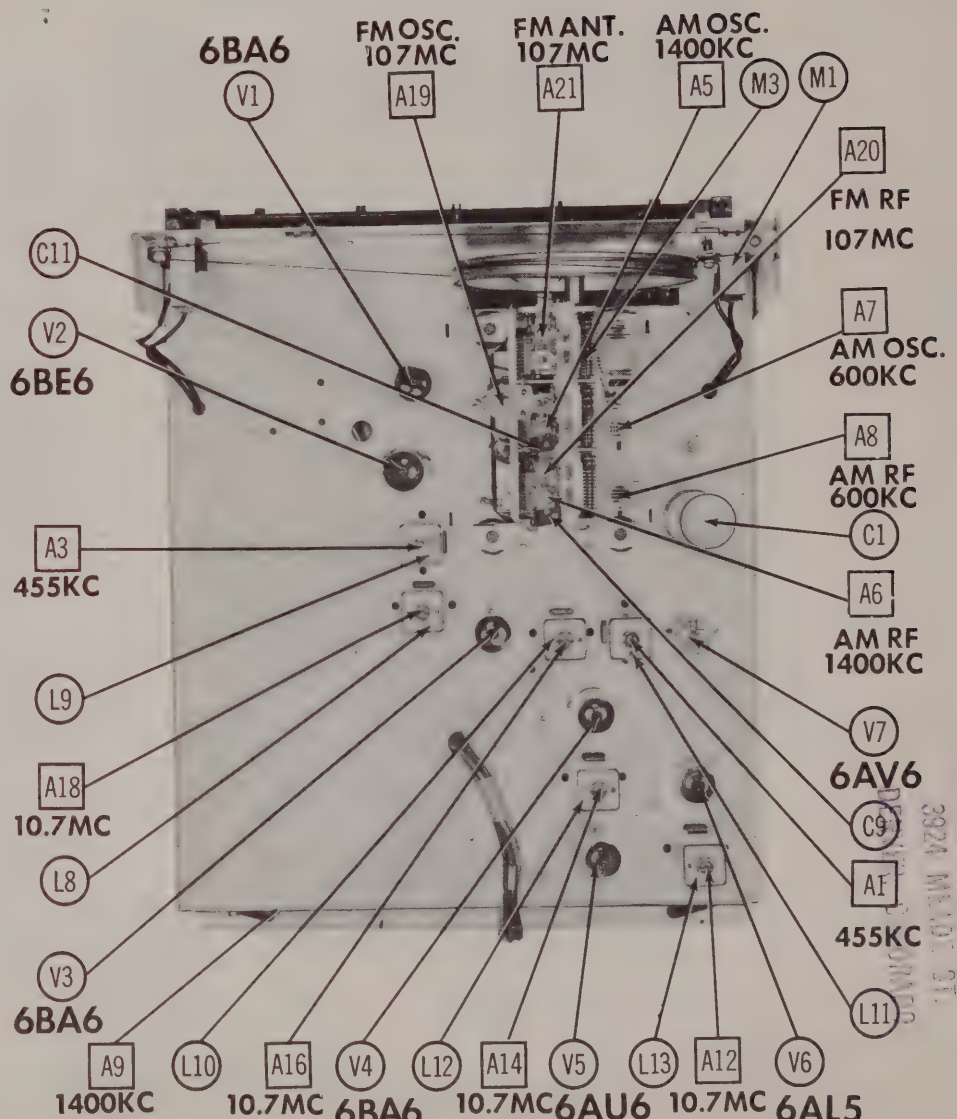
CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MAGNAVOX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	■20	475	270023-12	AFH3-31		C038			TVL-1835
B	▲10	475		PRS25/25		BR202			TVA-1205
C	20	25							
C2	220	500	250159-86	1468-221	D6-221	5W5T22	GP2K-221	MC240	1FM-325
C3	10000		250175-2	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C4	5000		250175-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C5	100	500	250187-53	1468-101	D6-101	5W5T1	GP1K-101	MC235	1FM-31
C6	10000		250175-2	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C7	47	500	250187-47	1468-470	D6-470	5W5Q47	GP1K-470	MC225	1FM-45
C8	.047	200	250202-11	P288-047	DF-503	CUB2S47		PT4147	2TM-S47
C9	15	500	250187-43	1469-150		22R5Q15			MS-415
C10	50	500	250088-39	SI50	D6-500	TP30	GP1K-500	UC-545	5GA-Q5
C11	15	500	250187-43	1469-150		22R5Q15			MS-415
C12	5000		250175-1	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C13	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C14	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C15	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C16	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C17	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C18	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C19	.047	200	250202-11	P288-047	DF-503	CUB2S47		PT4147	2TM-S47
C20	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C21	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C22	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C23	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C24	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C25	47	500	250187-49	1468-470	D6-470	5W5Q47	GP1K-470	MC225	1FM-45
C26	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C27	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C28	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C29	10000		250175-1	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C30	330	500	250159-88	1468-331	D6-331	5W5T33	GP2K-331	UC-5333	5GA-T33
C31	.001	600	250201-1	P688-001	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1
C32A	100		♦250170-1	♦PA-97-1	♦PC-50	♦111TM1	♦1403-01	UC-531	♦D-1
B	100							UC-531	
C33	100	500	250187-53	1468-101	D6-101	5W5T1	GP1K-101	MC235	1FM-31
C34	1000	500	250160-64	1468-102	D6-103	1W5D1	GP2L-102	MC255	1FM-21
C35	330	500	250159-88	1468-331	D6-331	5W5T33	GP2K-331	UC-5333	5GA-T33
C36	.01	600	250203-7	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1
C37	47	500	250187-49	1468-470	D6-470	5W5Q47	GP1K-470	MC225	1FM-45
C38	220	500	250159-86	1468-221	D6-221	5W5T22	GP2K-221	MC240	1FM-325
C39	.0068	600		P688-0068	D6-682	CUB6D68	GP2-333-682	PT6268	6TM-D68
C40	.0022	600	250201-3	P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22
C41	470	500	250159-90	1468-471	D6-471	5W5T47	GP2K-471	MC245	1FM-35
C42	.0022	600	250201-3	P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22
C43	.01	600	250203-7	P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1

♦ Items C32A, C32B, R24 are combined in one unit.

CHASSIS—TOP VIEW



PROPERTY OF L. F. BLANI... 3824 MAUD ST. ...

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MAGNAVOX PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1	1Meg	½	220071G4					Treble & Selectivity switch
R2A	1Meg	½	D220072G18	Q13-137	A47-1Meg-Z	B-70	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	1Meg	½	D220073G18	Q13-137	A47-1Meg-Z	B-70-8	U-53	Bass
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R3A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R4	10KΩ	½	230104-74	BTS-10K	
R5	68Ω	½	230104-48	BTS-68	
R6	47KΩ	1	230105-82	BTA-47K	
R7	10Ω	½	230104-38	BTS-10	Note 1
R8	4700Ω	½	230104-70	BTS-4700	
R9	1Meg	½	230104-98	BTS-1Meg	
R10	22KΩ	½	230104-78	BTS-22K	
R11	33Ω	½	230104-44	BTS-33	
R12	68Ω	½	230104-48	BTS-68	
R13	4700Ω	½	230104-70	BTS-4700	
R14	1000Ω	½	230104-62	BTS-1000	
R15	1Meg	½	230104-98	BTS-1Meg	
R16	1000Ω	½	230104-62	BTS-1000	
R17	100Ω	½	230104-50	BTS-100	
R18	1000Ω	½	230104-62	BTS-1000	
R19	1000Ω	½	230104-62	BTS-1000	
R20	220KΩ	½	230104-90	BTS-220K	
R21	1000Ω	½	230104-62	BTS-1000	
R22	1Meg	½	230104-98	BTS-1Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MAGNAVOX PART No.	IRC PART No.	
R23	3300Ω	1	230105-68	BTA-3300	
R24	47KΩ	½	♦250170-1	BTS-47K	
R25	47KΩ	½	230104-82	BTS-47K	
R26	220KΩ	½	230104-90	BTS-220K	
R27	8200Ω	1	230105-73	BTA-8200	
R28	8200Ω	1	230105-73	BTA-8200	
R29	68KΩ	½	230104-84	BTS-68K	
R30	100KΩ	½	230104-86	BTS-100K	
R31	150KΩ	½	230104-88	BTS-150K	
R32	150KΩ	½	230104-88	BTS-150K	
R33	100KΩ	½	230104-86	BTS-100K	
R34	100KΩ	½	230104-86	BTS-100K	
R35	470KΩ	½	230104-98	BTS-470K	
R36	3300Ω	½	230104-68	BTS-3300	
R37	100KΩ	½	230104-86	BTS-100K	
R38	330KΩ	½	230104-92	BTS-330K	
R39	47KΩ	½	230104-82	BTS-47K	
R40	6500Ω	½	240035-9		

Note 1. Not used in all versions.
♦ Items R24, C32A, C32B are combined in one unit.

COILS (RF-IF)

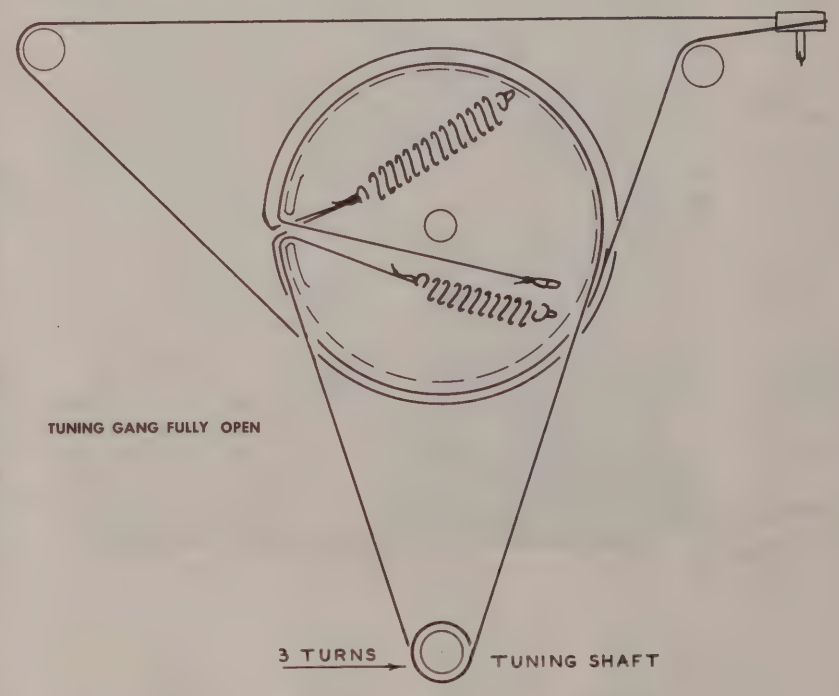
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MAGNAVOX PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Trans.	0Ω	0Ω	360321-2				
L2	AF Choke	.7Ω		360284-1	19-1003		4608	5 Microhenries
L3	FM RF Coil	0Ω		360322-2				
L4	FM Osc. Coil	0Ω		360323-1				Tapped
L5	AM Loop Ant.	8Ω		102426-2				Includes 2200Ω resistor, ant. loading coil & loop ant.
L6	AM RF Coil	23Ω	3.1Ω	360348-1			A-5495-RF■	
L7	AM Osc. Coil	4.2Ω*		360407-1	14-1033	BC-381 ▲	71-OSC ▲	
L9	1st. FM IF	1.1Ω	1.1Ω	360374-1	16-3487	FM-254	1463	
L9	AM Input	10Ω		360508-1				
L10	2nd. FM IF	1.2Ω	1.1Ω	360374-1	16-3487	FM-254	1463	
L11	AM Output	11Ω	11Ω	360373-1	16-6758	BC-353	12-C1	
L12	3rd. FM IF	1.2Ω	1.1Ω	360374-1	16-3487	FM-254	1463	
L13	Discriminator	.5Ω	1.5Ω	360375-1	17-3484 ♦	FM-253	1464	
L14	10KC Filter	225Ω		360244-2				

* Tapped @ .4Ω .
■ Enlarge mounting hole.
▲ Use secondary winding.
♦ Enlarge chassis hole and drill mounting holes.

PARTS LIST AND DESCRIPTIONS (Continued)

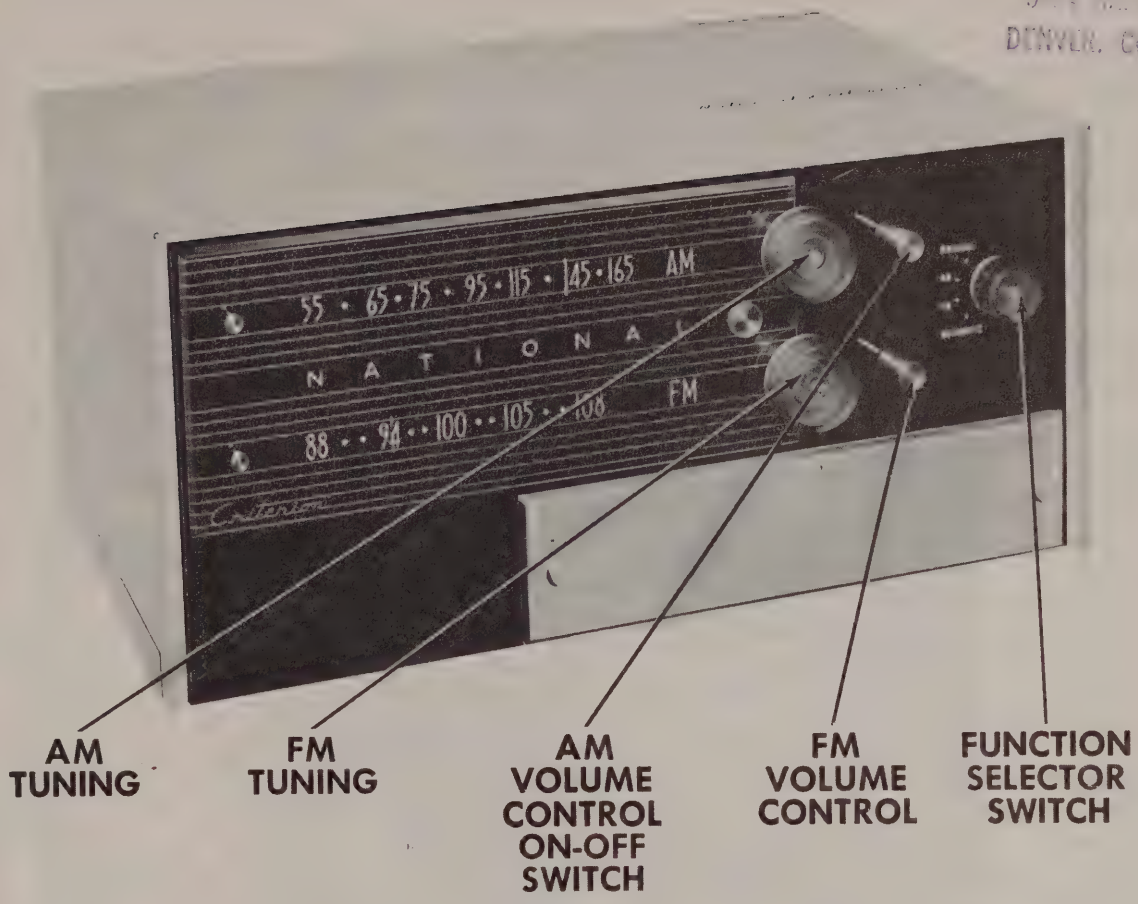
MISCELLANEOUS

ITEM No.	PART NAME	MAGNAVOX PART No.	NOTES
M1	Dial Light		#44 Bayonet
M2	Dial Light		#44 Bayonet
M3	Tuning Cap.	260103-1	26-535MMF, 13-520MMF, 17-190MMF
M4	Switch	160194-2	Selector
A9	Trimmer Cap.	260046-2	AM Loop Ant.
A19	Trimmer Cap.	260067-6	FM Osc. (3-12MMF)
	Dial Glass	150330-1	
	Dial Pointer	102426-2	



DIAL CORD STRINGING

DENVER, COLORADO


55 · 65 · 75 · 95 · 115 · 145 · 165 AM
NATIONAL
88 · · 94 · · 100 · · 105 · · 108 FM
Criterion
AM TUNING
FM TUNING
AM VOLUME CONTROL ON-OFF SWITCH
FM VOLUME CONTROL
FUNCTION SELECTOR SWITCH

NATIONAL
MODEL Criterion

TRADE NAME	National Model "Criterion"		
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden 48, Mass.		
TYPE SET	AC Operated AM-FM Superheterodyne Tuner for Custom Installation		
TUBES	Fourteen		
POWER SUPPLY	110-120 Volts AC-50/60 Cycles	RATING	.86 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1650KC	FREQ.MOD.	88MC-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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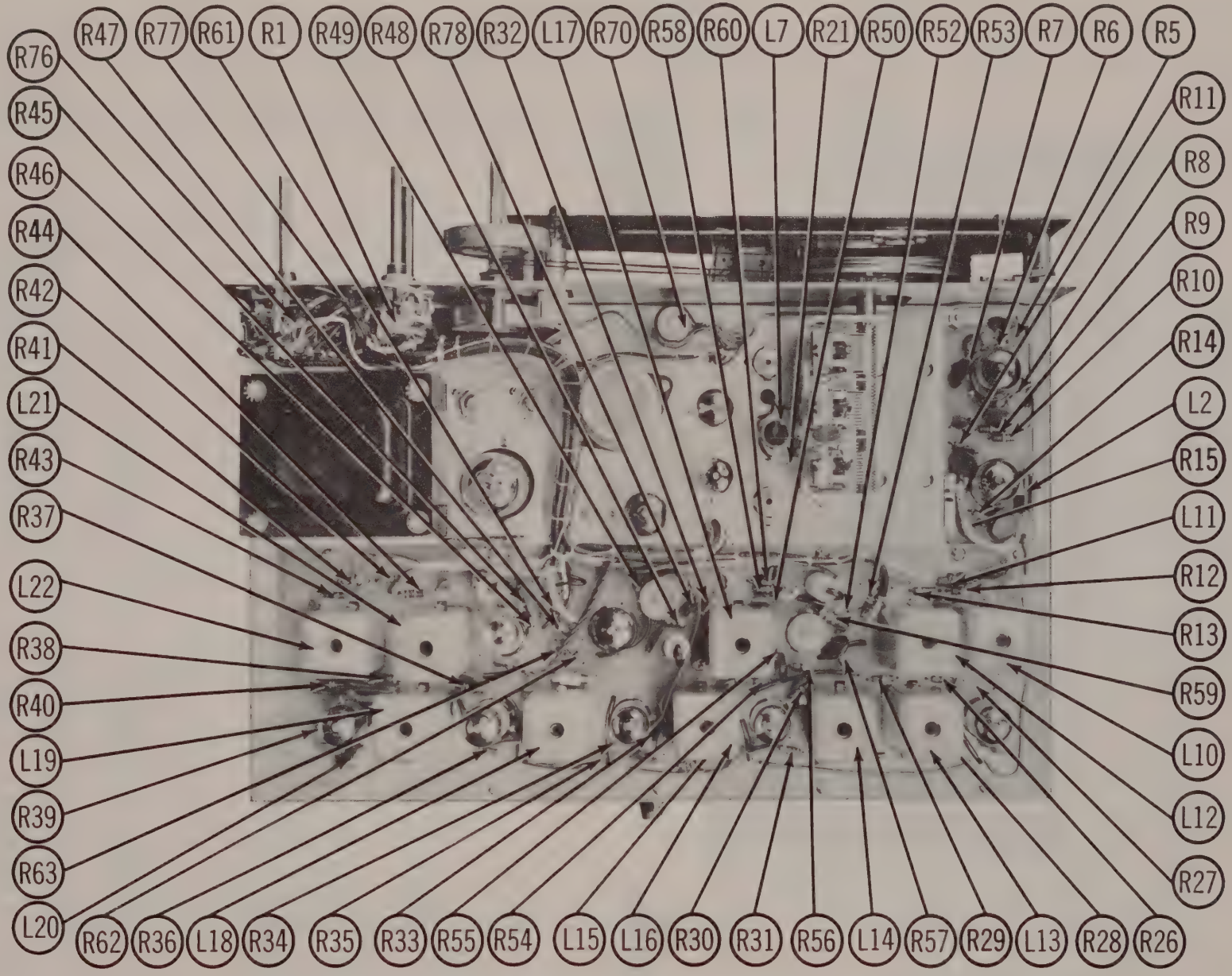
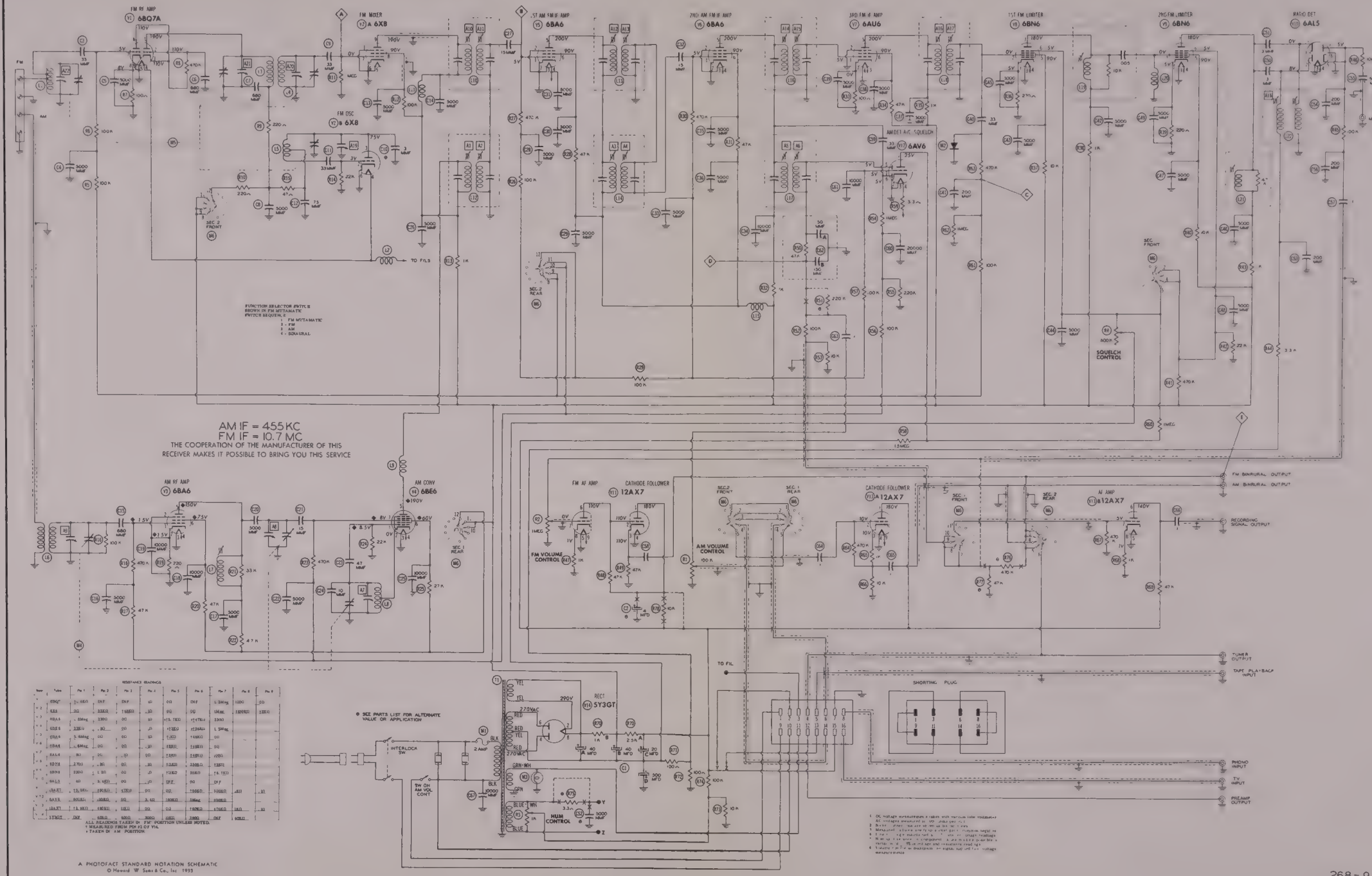
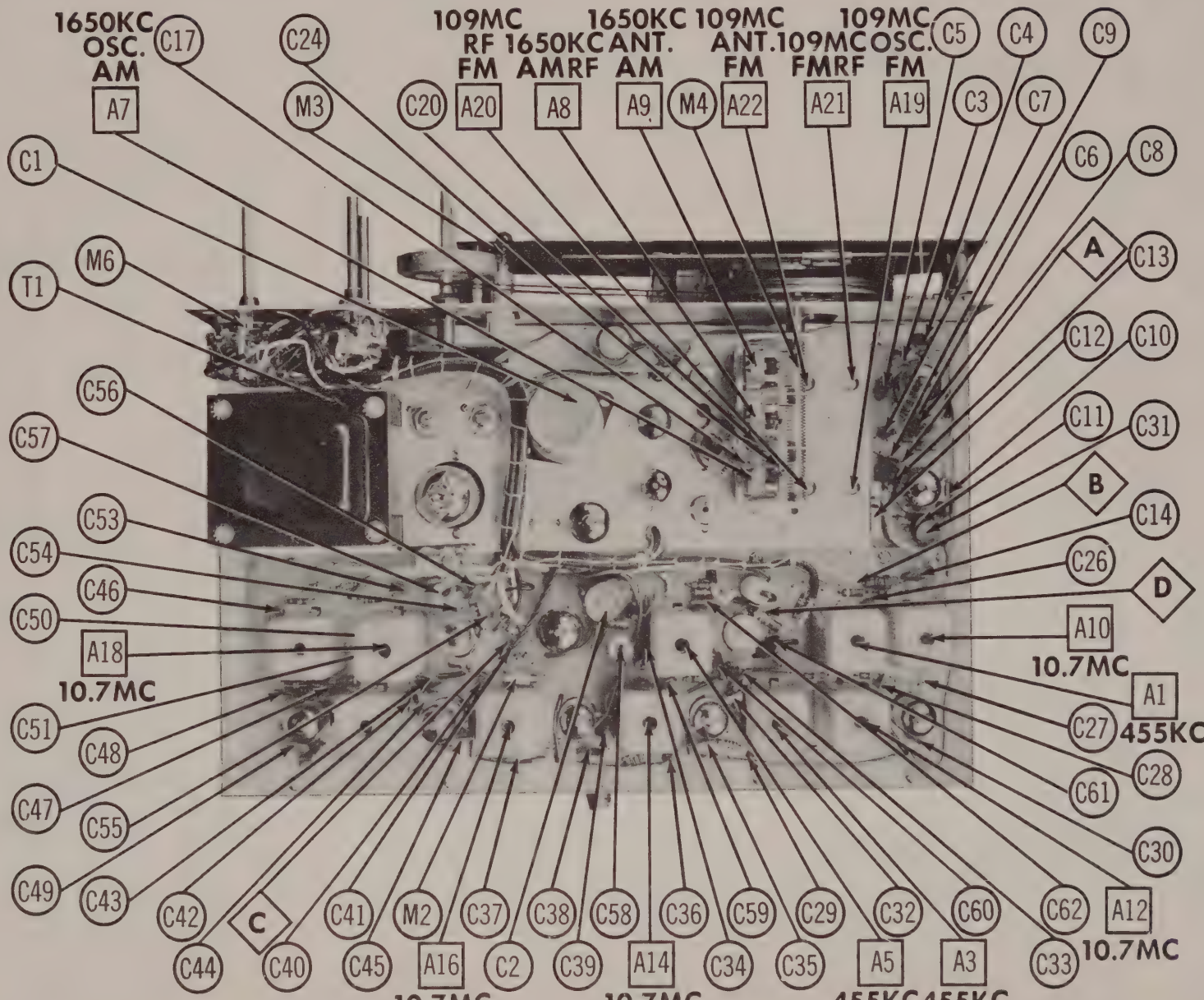


CHASSIS TOP VIEW-RESISTOR AND INDUCTOR IDENTIFICATION


AM IF = 455 KC
FM IF = 10.7 MC
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
FM RF AMP V1 6BQ7A
FM MIXER V2A 6X8
FM OSC V2B 6X8
1ST AM-FM IF AMP V5 6BA6
2ND AM-FM IF AMP V6 6BA6
3RD FM IF AMP V7 6AU6
AM DET AVC SQUELCH V17 6AV6
1ST FM LIMITER V8 6BN6
2ND FM LIMITER V9 6BN6
RATIO DET V10 6AL5
AM RF AMP V3 6BA6
AM CONV V4 6BE6
FM AF AMP CATHODE FOLLOWER V11 12AX7
CATHODE FOLLOWER V12A 12AX7
AF AMP V11B 12AX7
RECT V14 5Y3GT
FUNCTION SELECTOR SWITCH SHOWN IN FM MUTAMATIC SWITCH SEQUENCE
1 - FM MUTAMATIC
2 - FM
3 - AM
4 - BINAURAL
AM VOLUME CONTROL
FM VOLUME CONTROL
SQUELCH CONTROL
HUM CONTROL
INTERLOCK SW
SW ON AM VOL CONT
SHORTING PLUG
TO FIL
TO FIL 3
FM BINURAL OUTPUT
AM BINURAL OUTPUT
RECORDING SIGNAL OUTPUT
TUNER OUTPUT
TAPE PLAYBACK INPUT
PHONO INPUT
TV INPUT
PREAMP OUTPUT
FM MULTIPLEX
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
RESISTANCE READINGS
ALL READINGS TAKEN IN FM POSITION UNLESS NOTED.
* MEASURED FROM PIN #2 OF V14
+ TAKEN IN AM POSITION
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
268-9



CHASSIS TOP VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

NATIONAL
MODEL Criterion

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Output of signal generator should be just high enough to provide usable oscilloscope curve.

AM IF ALIGNMENT USING AM SIGNAL GENERATOR AND OSCILLOSCOPE

Short AM oscillator rotor gan (rear gang) to ground to prevent interference.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 7 (grid) of 6BE6 (V4). Low side to chassis.	455KC (50KC Swp)	AM	Point of non-interference	Vert. Amp. thru RF probe to pin 5 (plate) of 6BA6 (V5). Low side to chassis.	A1, A2	Shunt L12 primary with 1KΩ, 1/2 watt resistor. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
2.	"	"	"	"	"	"	A3, A4	Move 1KΩ shunt to L17 primary. Adjust as in step 1. Remove 1KΩ shunt.
3.	"	"	"	"	"	Vert. Amp. to point (B). Low side to chassis.	A5, A6	Adjust for optimum bandpass characteristics.

AM RF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove AM oscillator short.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	Direct	High side to AM antenna terminal lug. Low side to chassis.	1650KC (Unmod)	AM	1650KC	DC probe to point (D). Common to chassis.	A7, A8 A9	Adjust for maximum deflection.

FM IF ALIGNMENT CHECK

Insert 10Ω resistor between pin 7 (grid) of 6X8 (V2) and ground.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	Direct	High side to point (A). Low side to frame of AM tuning gang.	10.7MC (4MC Swp)	FM	Point of non-interference	Vert. Amp. to point (C). Low side to chassis.		Insert jumper from point B (FM AGC) to chassis. Adjust generator center freq. and width for best possible curve similar to Fig. 2. Use minimum input to prevent distortion of curve. If curve is not symmetrical, adjust A12 and A13 to obtain correct curve. If this fails, the FM IF must be completely realigned.

FM IF AND DETECTOR ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Insert 10Ω resistor between pin 7 (grid) of 6X8 (V2) and ground.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	1KΩ Resistor	High side thru 1KΩ to point (A). Low side to chassis.	10.7MC (300KC Swp)	FM	Point of non-interference	Vert. Amp. thru RF probe to pin 5 (plate) of 6BA6 (V5). Low side to chassis.	A10, A11	Shunt primary of L13 with 1KΩ resistor. Adjust for curve similar to Fig. 3. Keep curve centered on 10.7MC marker.
7.	"	"	"	"	"	"	A12, A13	Move 1KΩ shunt to L16 primary. Proceed as in step 6.
8.	"	"	"	"	"	"	A14, A15	Move 1KΩ shunt to L18 primary. Proceed as in step 6.
9.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A16, A17	Short FM AVC (point B) to chassis. Proceed as in step 6. Leave AVC shorted for detector alignment.
10.	"	"	"	"	"	Vert. Amp. to point (E). Low side to chassis.	A18	Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
11.	Direct	High side to FM antenna terminal. Low side to chassis.	109MC (Unmod)	FM	109MC	DC probe to point (B). Common to chassis.	A19, A20, A21, A22	Adjust for maximum deflection while slightly rocking tuning gang.
12.	"	"	87.5MC	"	87.5MC	"	L1, L3 L4, L5	Adjust for maximum deflection by expanding or compressing L1, L3, L4, and L5.

FIG. 1

FIG. 2

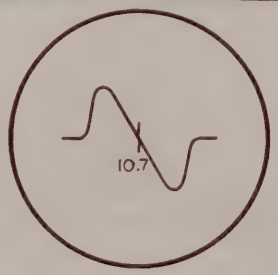
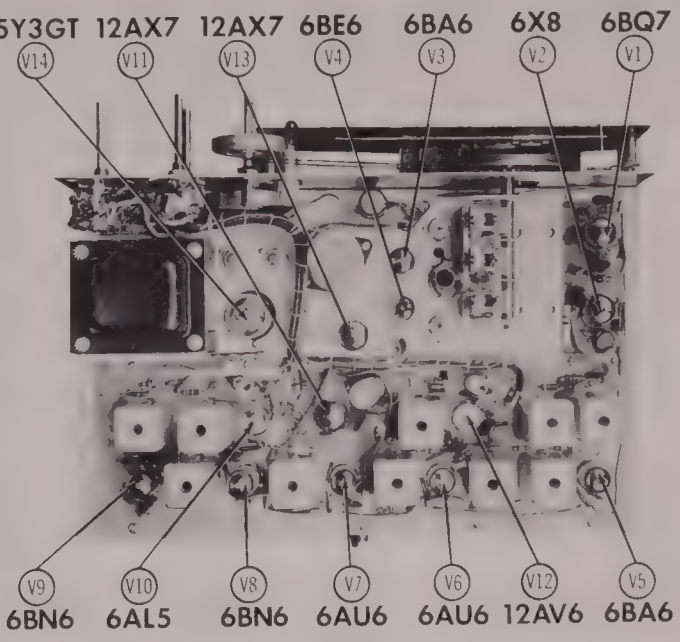
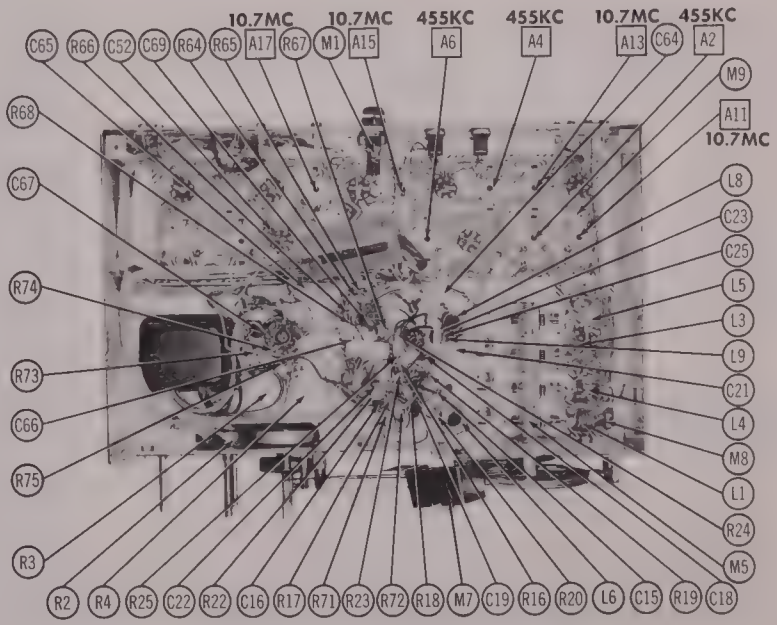


FIG. 3



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT		
V1	FM RF Amplifier	6BQ7	6BQ7	9AJ	
V2	FM Osc.-FM Mixer	6X8	6X8	9AK	
V3	AM RF Amplifier	6BA6	6BA6	7BK	
V4	AM Converter	6BE6	6BE6	7CH	
V5	1st. AM FM IF Amp	6BA6	6BA6	7BK	
V6	2nd. AM FM IF Amp	6BA6	6BA6	7BK	
V7	3rd. FM IF Amp.	6AU6	6AU6	7BK	
V8	1st. FM Limiter	6BN6	6BN6	7DF	
V9	2nd. FM Limiter	6BN6	6BN6	7DF	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	FM AF Amplifier-Cath. Follower	12AX7	12AX7	9A	
V12	AM Det.-AVC - Squelch	6AV6	6AV6	7BT	
V13	AF Amp-Cathode Follower	12AX7	12AX7	9A	
V14	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

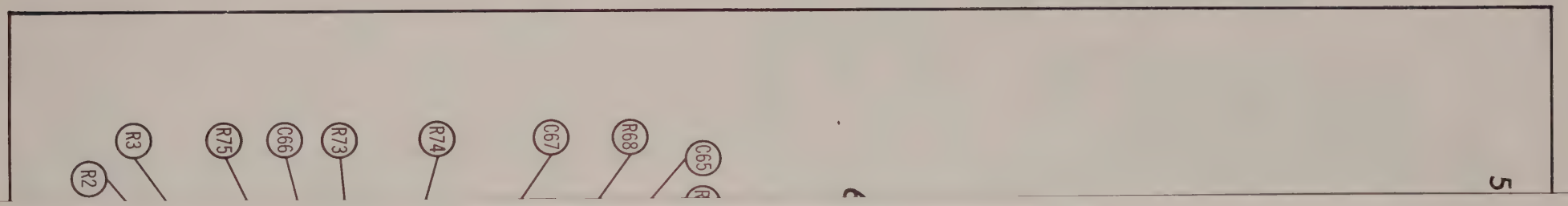
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	NATIONAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No
C1A	▲40	100		APH4-06		C033		FP376.9	TVL-3786
B	▲40	350		PRS15/500		BRH155		TC1505	TVA-1162
C	▲20	300							
D	500	15							
C2	4	250	①	PRS250/4		BR425		TC50X	TVA-1501
C3	33			SI33	D6-330	G029	831-330	UC-5433	5GA-Q33
C4	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C5	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C6	680			BPD-681	D6-681	G085	811-681	UC-5368	5GA-T68
C7	680			BPD-681	D6-681	G085	811-681	UC-5368	5GA-T68
C8	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C9	33			SI33	D6-330	G029	831-330	UC-5433	5GA-Q33
C10	3		②		TCN-3.3		N750A-3R3		
C11	33			SI33	D6-330	G029	831-330	UC-5433	5GA-Q33
C12	75							N470L-750	
C13	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C14	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C15	680			BPD-681	D6-681	G085	811-681	UC-5368	5GA-T68
C16	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C17	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C18	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-81

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	NATIONAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No
C19	10000			BPD 01	DD-103	K082	811-01	DC-511	5HK-81
C20	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C21	15			SI15NP0	TCZ-15	TZ11		NP0K-150	ZT-5415	5TCC-Q15
C22	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C23	47			BPD-470	D6-470	G033	831-470	UC-5447	5GA-Q47
C24	10			SI10NP0	TCZ-10	TZ09		NP0K-100	ZT-541	5TCC-Q1
C25	10000			BPD 01	DD-103	K082	811-01	DC-511	5HK-81
C26	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C27	15			SI15	D6-150	TP11		GP1K-150	UC-5415	5GA-Q15
C28	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C29	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C30	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C31	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C32	15			SI15	D6-150	TP11		GP1K-150	UC-5415	5GA-Q15
C33	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C34	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-81
C35	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C36	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C37	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C38	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C39	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C40	33			SI33	D6-330	G029	831-330	UC-5433	5GA-Q33
C41	200			SI200	D6-201	G050	811-201	UC-532	5GA-T2
C42	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C43	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C44	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C45	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C46	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C47	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C48	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C49	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C50	3				TCN-3.3		N750A-3R3		
C51	3				TCN-3.3		N750A-3R3		
C52	5000		①	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C53	200			SI200	D6-201	G050	811-201	UC-532	5GA-T2
C54	200			SI200	D6-201	G050	811-201	UC-532	5GA-T2
C55	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C56	200			SI200	D6-201	G050	811-201	UC-532	5GA-T2
C57	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1
C58	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1
C59	33			SI33	D6-330	G029	831-330	UC-5433	5GA-Q33
C60	20000			BPD-02	DF-203	K085	817-02		5HK-S2
C61	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-81
C62A	150		•T604-1	•PA-98	•PC-51	•111TM2	•1403-02	UC-531	•D-2
B								UC-531	
C63	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1
C64	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1
C65	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1
C66	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA NATIONAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C67	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1

Note 1. Not used in all versions.
Note 2. Some versions use 1MMF in this application.
♦ Items C62A, C62B and R50 are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA NATIONAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100KΩ	½	T578-2	Q13-128	A47-100K-Z	AB-41	U-39	AM Volume
B	Shaft		Not Req.	Not Req.	RS-2	AK-9	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A
R2A	1Meg	½	T578-1	Q13-137	A47-1Meg-Z	AB-70	U-53	FM Volume
B	Shaft		Not Req.	Not Req.	RS-2	AK-9	Not Req.	Attach to R2A
R3A	1000Ω	½	T013-5	Q11-108	A47-1000-S	AB-5	U-4	Hum Balance - Note
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R3A
R4A	500KΩ	½	T013-7	Q11-133	A47-500K-S	AB-58	SU-50	Squelch
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R4A

Note: Some versions may use an alternate control part no. T013-8.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA NATIONAL PART No.	IRC PART No.	NOTES
R5	100KΩ	½		BTS-100K	
R6	100KΩ	½		BTS-100K	
R7	100Ω	½		BTS-100	
R8	470KΩ	½		BTS-470K	
R9	220Ω	½		BTS-220	
R10	220Ω	½		BTS-220	
R11	1Meg	½		BTS-1Meg	
R12	100KΩ	½		BTS-100K	
R13	1000Ω	½		BTS-1000	
R14	22KΩ	½		BTS-22K	
R15	47KΩ	½		BTS-47K	
R16	100KΩ	½		BTS-100K	
R17	47KΩ	½		BTS-47K	
R18	470KΩ	½		BTS-470K	
R19	220Ω	½		BTS-220	
R20	47KΩ	½		BTS-47K	
R21	33KΩ	½		BTS-33K	
R22	4700Ω	½		BTS-4700	
R23	470KΩ	½		BTS-470K	
R24	22KΩ	½		BTS-22K	
R25	27KΩ	½		BTS-27K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA NATIONAL PART No.	IRC PART No.	NOTES
R26	100KΩ	½		BTS-100K	
R27	470KΩ	½		BTS-470K	
R28	47KΩ	½		BTS-47K	
R29	100KΩ	½		BTS-100K	
R30	470KΩ	½		BTS-470K	
R31	47KΩ	½		BTS-47K	
R32	1000Ω	½		BTS-1000	
R33	100Ω	½		BTS-100	
R34	47KΩ	½		BTS-47K	
R35	1000Ω	½		BTS-1000	
R36	270Ω 5%	½		BTS-270 5%	
R37	10KΩ	½		BTS-10K	
R38	1000Ω	½		BTS-1000	
R39	220Ω 5%	½		BTS-220 5%	
R40	10KΩ	½		BTS-10K	
R41	470KΩ	½		BTS-470K	
R42	22KΩ	½		BTS-22K	
R43	1000Ω	½		BTS-1000	
R44	3300Ω	½		BTS-3300	
R45	100KΩ	½		BTS-100K	
R46	100KΩ	½		BTS-100K	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA NATIONAL PART No.	IRC PART No.	NOTES
R47	1000Ω	½		BTS-1000	
R48	47KΩ	½		BTS-47K	
R49	47KΩ	½		BTS-47K	
R50	47KΩ	½	♦T604-1	BTS-47K	
R51	220KΩ	½		BTS-220K	Note 1
R52	100KΩ	½		BTS-100K	
R53	10KΩ	½		BTS-10K	
R54	1Meg	½		BTS-1Meg	
R55	220KΩ	½		BTS-220K	Note 2
R56	100KΩ	½		BTS-100K	
R57	100KΩ	½		BTS-100K	
R58	1.5Meg	½		BTS-1.5Meg	
R59	3.3Ω	½			
R60	1Meg	½		BTS-1Meg	
R61	100KΩ	½		BTS-100K	
R62	1Meg	½		BTS-1Meg	
R63	470KΩ	½		BTS-470K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA NATIONAL PART No.	IRC PART No.	NOTES
R64	470KΩ	½		BTS-470K	
R65	1000Ω	½		BTS-1000	
R66	10KΩ	½		BTS-10K	
R67	470KΩ	½		BTS-470K	
R68	1000Ω	½		BTS-1000	
R69	47KΩ	½		BTS-47K	
R70A	2500Ω	10			
B	1000Ω	10			
R71	100Ω	½		BTS-100	
R72	100Ω	½		BTS-100	
R73	10KΩ	½		BTS-10K	
R74	100KΩ	½		BTS-100K	
R75	3.3Ω	1			Note 1
R76	470KΩ	½		BTS-470K	Note 1
R77	47KΩ	½		BTS-47K	Note 1
R78	10KΩ	½		BTS-10K	Note 1

♦ Items R50, C62A and C62B are combined in one unit.
Note 1: Not used in some versions.
Note 2: Some versions may use a 1Meg resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA NATIONAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ .86A	606VCT .118ADC	5VAC @ 2A	6.3VAC @ .27A SEC. 4 6.3VAC @ 3.9A						

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA NATIONAL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω						Tapped
L2	Fil. Choke	0Ω		SB:2602	19-1002		4606	2 Microhenries
L3	FM RF Primary Coil	0Ω		T618-1				
L4	FM RF Secondary Coil	0Ω		T619-1				
L5	FM Osc. Coil	0Ω		T617-1				Tapped
L6	AM Ant. Coil	8.5Ω	5.3Ω	T565-1	14-1026 ▲	BC-380 ▲	72-A *	
L7	AM RF Coil	5.5Ω		T566-1	14-1027 ♦	BC-382■	72-RF ♦	
L8	AM Osc. Coil	5.5Ω		T567-1	14-1033▲	BC-381▲	71-Osc. ♦	Tapped at .8Ω
L9	RF Choke	0Ω		SB:2602	19-1002		4606	2 Microhenries

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA NATIONAL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L10	1st FM IF	.1Ω	.1Ω	T608-1				
L11	RF Choke	5Ω		SA:3003	19-3093	TV-181	4642	100 Microhenries
L12	1st AM IF	3.9Ω	3.9Ω	T608-7				
L13	2nd FM IF	.1Ω	.1Ω	T608-2				
L14	2nd AM IF	3.8Ω	3.8Ω	T608-8				
L15	RF Choke	5Ω		SA:3003	19-3093	TV-181	4642	100 Microhenries
L16	3rd FM IF	.1Ω	.1Ω	T608-3				
L17	3rd AM IF	3.8Ω	3.8Ω	T608-9				
L18	4th FM IF	.1Ω	.1Ω	T608-4				
L19	1st FM Limiter	1.1Ω		T608-5				Includes resistor & cap.
L20	RF Choke	5Ω		SA:3003	19-3093	TV-181	4642	100 Microhenries
L21	2nd FM Limiter	1.1Ω		T608-6				Includes resistor
L22	FM Det. Trans.	1.9Ω	1.4Ω	T609-1				

▲ Drill mounting hole.
▲ Drill mounting hole & use secondary winding.
♦ Drill mounting hole & use primary winding.

FUSES

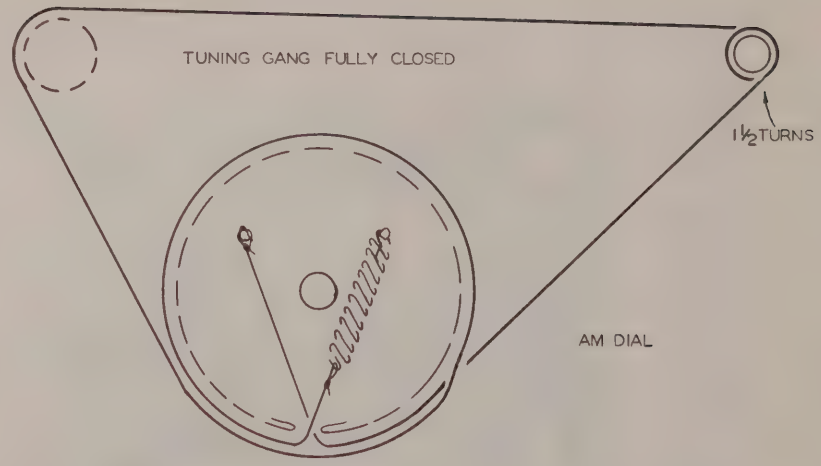
ITEM No.	TYPE	RATING	REPLACEMENT DATA NATIONAL PART No. FUSE	NATIONAL HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE HOLDER	BUSS PART No. FUSE	BUSS HOLDER
M1	3AG	2A 250V		E510-1	312002 (3AG/2A / 250V)	342001	AGC-2	HKP

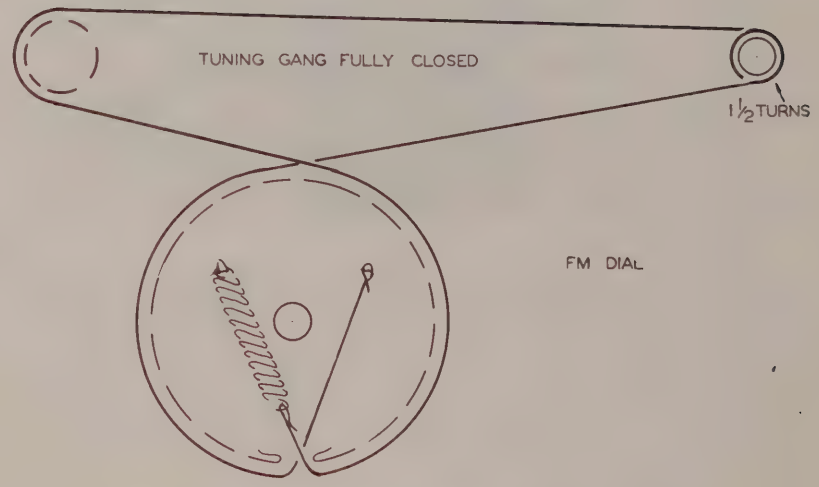
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA NATIONAL PART No.	FEDERAL PART No.	SYLVANIA PART No.	NOTES
M2	1N60	T614-1	1N64A	1N60 or 1N132	AVC Rectifier (FM)

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
M3	Dial Light		#47, Bayonet
M4	Tuning Cap.	T441-1	AM (30-390MMF, 16-375MMF, 28-190MMF)
M5	Tuning Cap.	T442-1	FM
M6	Switch	T453-1	Selector
M7	Switch		Interlock
M8	Printed Circuit	T606-1	FM RF
M9	Printed Circuit	T605-1	IF

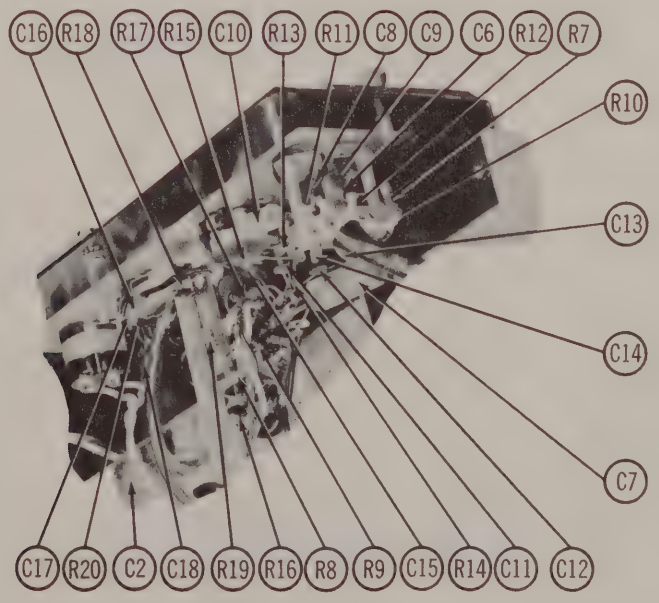




DIAL CORD STRINGING

PROF
L. F. D.
3924 Mc
DENVER, COLORADO

TRADE NAME	National Model "Horizon 10"
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden 48, Mass.
TYPE SET	AC Operated 4 Channel 10 Watt Audio Amplifier
TUBES (Five)	Types 12AX7 Pre-Amp., 12AX7 AF Amp.-Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-50/60 Cycles RATING .66 Amp. @ 117 Volts AC



FRONT DECK—PARTIAL REAR VIEW

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

NATIONAL
MODEL "Horizon 10"

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT		
V1	Pre-Amplifier	12AX7	12AX7	9A	
V2	AF Amplifier-Phase Inverter	12AX7	12AX7	9A	
V3	Output	6V6GT	6V6GT	7S	
V4	Output	6V6GT	6V6GT	7S	
V5	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

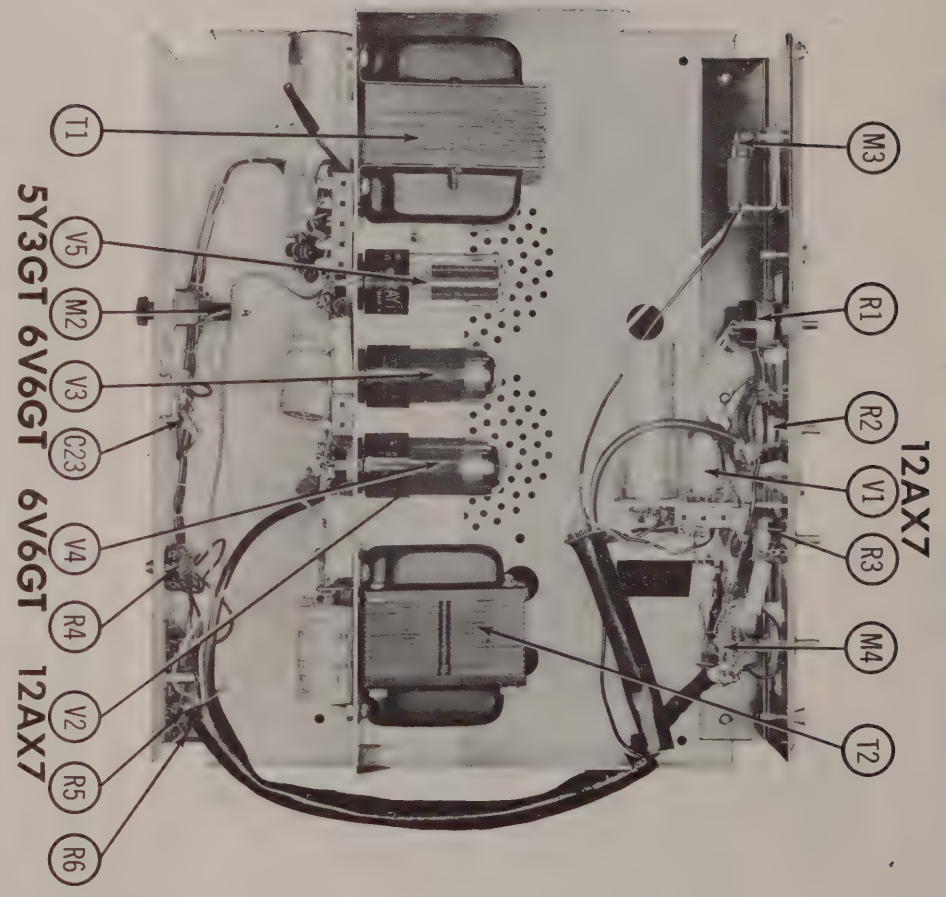
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	NATIONAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	■40	450		AFH3-46				FP378	TVL-3787
B	▬80	450							TVA-1709
C	20	450							
C2A	■40	300		AFH1-34		A038			
B	▲50	6		PRS150/50-		BBR50-6			
C	50	6		50		BBR50-6			
C3	20	450		PRS450/20		BR2045		TC75	TVA-1709
C4	20	450		PRS450/20		BR2045		TC75	TVA-1709
C5	4	450		PRS450/4		BR445		TC70	TVA-1702
C6	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15
C7	.1	200							
C8	56			BPD-000056	DD-560	G036	GP1K-560	UC-5456	5GA-Q56
C9	56			BPD-000056	DD-560	G036	GP1K-560	UC-5456	5GA-Q56
C10	.015	200							
C11	270			BPD-00027	DD-271	G054	GP2K-271	UC-5327	5GA-T27
C12	680			BPD-00068	DD-681	G065	GP2K-681	UC-5368	5GA-T68
C13	1200			BPD-0012	DD-122	G070	801-0012	DC-5212	5HK-D12
C14	15			BPD-000056	DD-560	G036	GP1K-560	UC-5456	5GA-Q56
C15	10000			BPD-01	DD-103	K082	801-01	DC-511	5HK-S1
C16	220			BPD-00022	DD-221	G051	GP1K-221	UC-5322	5GA-T22
C17	330			BPD-00033	DD-331	G056	GP1K-331	UC-5333	5GA-T33
C18	2000			BPD-002	DD-202	K072	801-002	DC-522	5HK-D2
C19	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C20	.1	400							
C21	.1	400							
C22	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C23	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg	½	T688-1	Q13-139	A47-2Meg-Z	AB-76	U-55	Bass
B	Shaft		Not Req.	Not Req.	FS-3	AK-24	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A
R2A	2Meg	½	T013-6	Q17-139		AB-76		Treble
B	Shaft		Not Req.	Not Req.		AK-24		Attach to R2A
R3	2Meg	½	T748-1	Q17-139X		BT-81	UT-450	Loudness - tapped @ 112KΩ
R4A	1000Ω	½	T013-5	Q11-108	A47-1000-S	AB-5	U-4	Hum Balance
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R5	56KΩ	1/2		BTS-56KΩ	
R6	27KΩ	1/2		BTS-27K	
R7	39KΩ	1/2		BTS-39K	
R8	1800Ω	1/2		BTS-1800	
R9	220KΩ	1/2		BTS-220K	
R10	56KΩ	1/2		BTS-56K	Note 3
R11	330KΩ	1/2		BTS-330K	
R12	330KΩ	1/2		BTS-330K	
R13	15KΩ	1/2		BTS-15K	
R14	1Meg	1/2		BTS-1Meg	
R15	8.2Meg	1/2		BTS-8.2Meg	
R16	2700Ω	1/2		BTS-2700	Note 1
R17	270KΩ	1/2		BTS-270K	
R18	1Meg	1/2		BTS-1Meg	
R19	33KΩ	1/2		BTS-33K	
R20	120KΩ	1/2		BTS-120K	
R21	470Ω	1/2		BTS-470	Note 2
R22	470KΩ	1/2		BTS-470K	
R23	68KΩ	2		BTB-68K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R24	5600Ω	1		BTA-5600	
R25	1Meg	1/2		BTS-1Meg	
R26	1200Ω	1/2		BTS-1200	
R27	33KΩ 5%	1/2		BTS-33K 5%	
R28	33KΩ 5%	1/2		BTS-33K 5%	
R29	4.7Meg 5%	1/2		BTS-4.7Meg 5%	
R30	4.7Meg 5%	1/2		BTS-4.7Meg 5%	
R31	4700Ω	1/2		BTS-4700	
R32	470Ω	1/2		BTS-470Ω	
R33	270KΩ 5%	1/2		BTS-270K 5%	
R34	470Ω	1/2		BTS-470	
R35	270KΩ 5%	1/2		BTS-270K 5%	
R36	22KΩ	1/2		BTS-22K	
R37	470Ω	2		BTB-470	
R38	470Ω	2		BTB-470	
R39	100KΩ	1		BTA-100K	
R40	10KΩ	1/2		BTS-10K	

Note 1: Some versions may use a 3300Ω in this application.
Note 2: Some versions may use a 330Ω in this application.
Note 3. Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA NATIONAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC	660VCT	5VAC	6.3VAC	T661-1	PC-8409①		R-11A	P9310①	24R04U
	②.66A	.080A	②2A	②1.7A		②		① ②	②	① ②

① Drill new mounting holes.
② Tape 6.3V center tap.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI. 1	IMPEDANCE SEC.	REPLACEMENT DATA NATIONAL PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	2.35KΩ	16Ω	T659-1						
	PRI. 2	tap ②							
	2.35KΩ	8Ω							

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA NATIONAL PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	NOTES
M1	.005A	T657-1	323D8490			026-25H-Q	V17HP	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA NATIONAL PART No. FUSE	NATIONAL PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	3AG	1A-250V		E510-1	312001 (3AG-1A)	342001	AGC 1	HKP

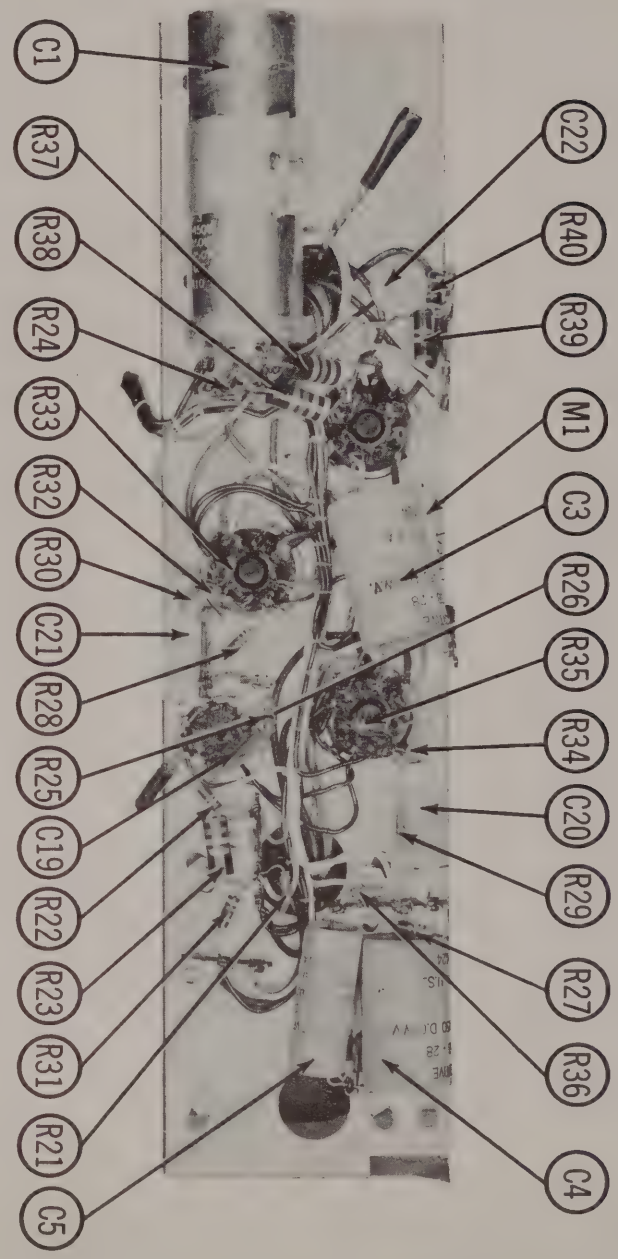
MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
M3	Panel Light		#47 Bayonet
M4	Switch	T663-1	Selector
	Knob	SB:2819	4 used

SET 268 FOLDER 10

NATIONAL MODEL "Horizon 10"

REAR DECK - REAR VIEW



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L. F. BRANKENSHIP
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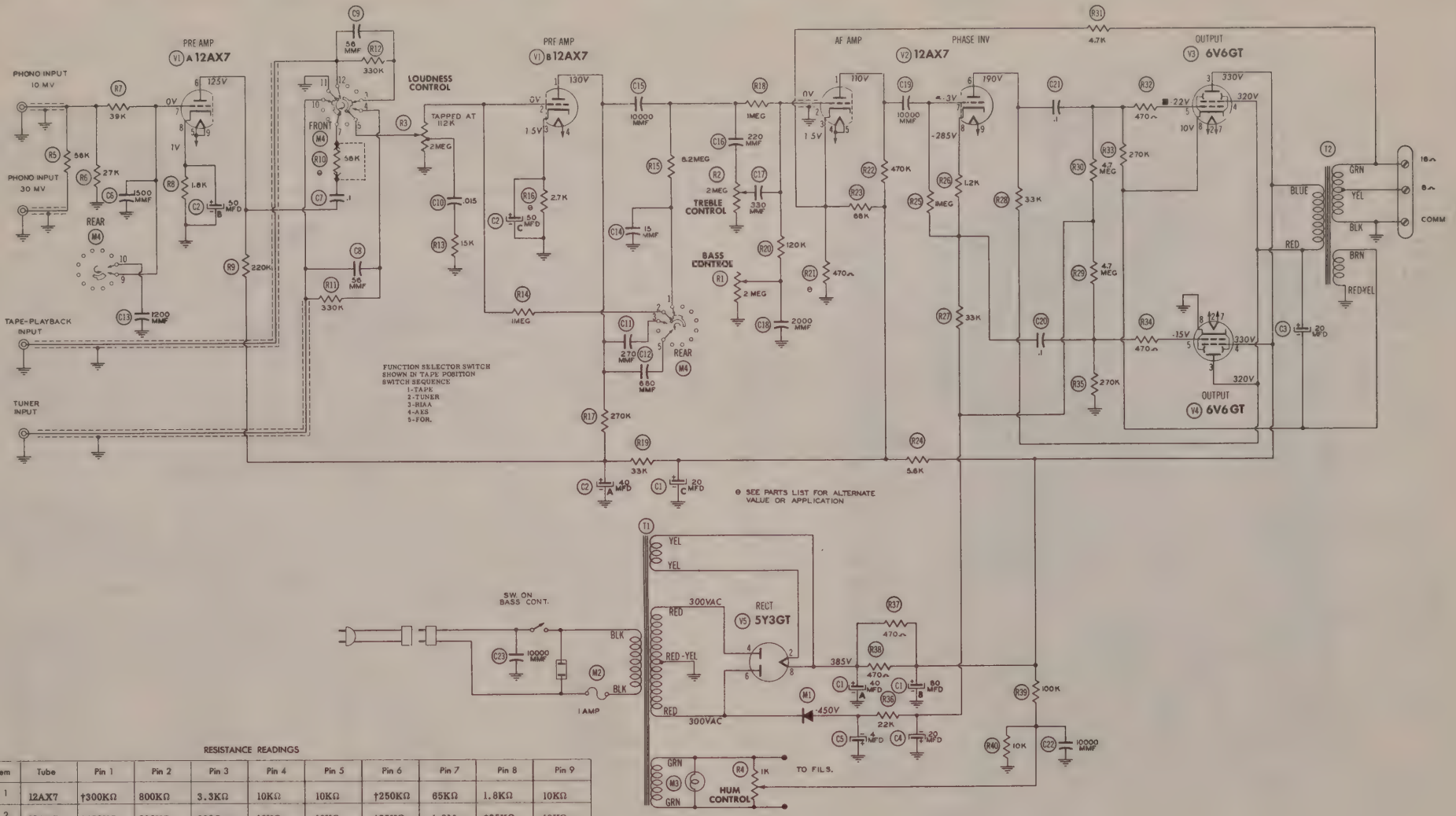
DENVER, COLORADO.

NATIONAL MODEL "Horizon 10"



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†300KΩ	800KΩ	3.3KΩ	10KΩ	10KΩ	†250KΩ	65KΩ	1.8KΩ	10KΩ
V 2	12AX7	†450KΩ	230KΩ	330Ω	10KΩ	10KΩ	†35KΩ	1.3Meg	*35KΩ	10KΩ
V 3	6V6GT	.8Ω	10KΩ	†260Ω	†85Ω	270KΩ	270KΩ	10KΩ	8Ω	
V 4	6V6GT	INF	10KΩ	†85Ω	†470Ω	270KΩ	270KΩ	10KΩ	0Ω	
V 5	5Y3GT	INF	25KΩ	150Ω	150Ω	INF	160Ω	100Ω	25KΩ	

▪ MEASURED FROM PIN 8 OF V2
† MEASURED FROM PIN 2 OF V5
* MEASURED FROM OUTPUT OF M1
■ MEASURED FROM PIN 8 OF V3

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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RCA VICTOR MODELS 24-S-512, U, 24-S-513, U, 24-S-514, U, 24-S-529, U, 24-S-531, U, 24-S-532, U (Ch. KCS84F, H, J, K)

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RCA VICTOR MODELS 24-S-512, U, 24-S-513, U, 24-S-514, U, 24-S-529, U, 24-S-531, U, 24-S-532, U (Ch. KCS84F, H, J, K)

RCA VICTOR MODEL 24-S-529

TRADE NAME	RCA Victor	MODELS	CHASSIS	TUNER
		24-S-512, 24-S-513, 24-S-514, 24-S-529, 24-S-532	KCS84F	KRK22D
		24-S-512U, 24-S-513U, 24-S-514U, 24-S-529U, 24-S-532U	KCS84H	KRK30D (or E)
		24-S-531	KCS84J	KRK22D
		24-S-531U	KCS84K	KRK30D (or E)

MANUFACTURER Radio Corp. of America, RCA Victor Television Div., Camden 2, N.J.
TYPE SET Television Receiver
TUBES Twenty-two
POWER SUPPLY 110-120 Volts AC-60 Cycles RATING 1.89 Amp. @ 117 Volts AC
TUNING RANGE Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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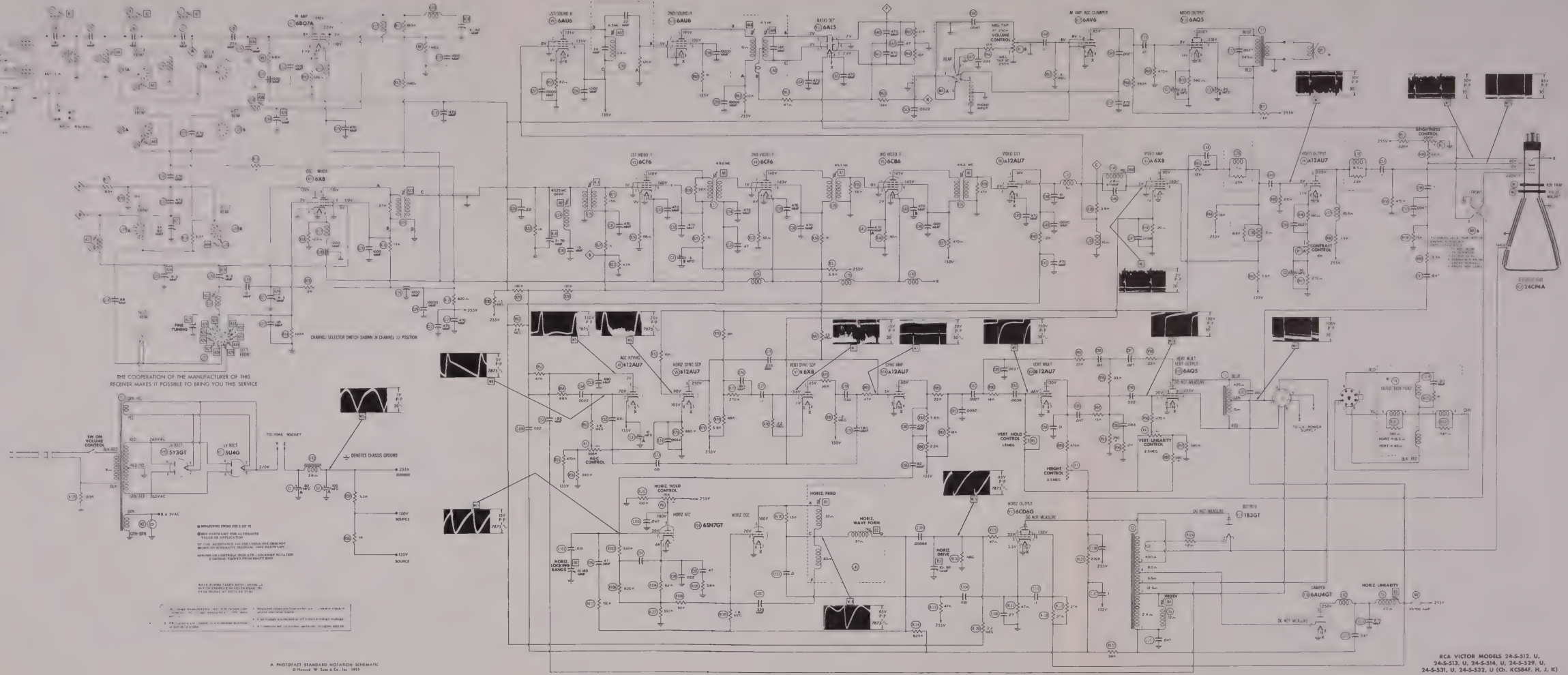
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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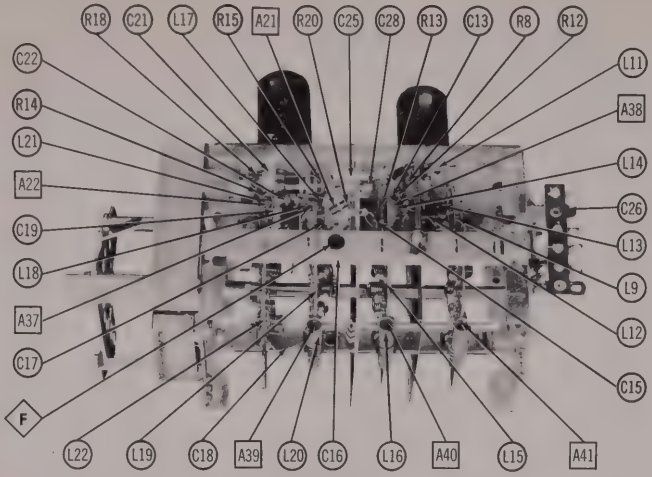
RCA VICTOR MODELS 24-S-512, U, 24-S-513, U, 24-S-514, U, 24-S-529, U, 24-S-531, U, 24-S-532, U (Ch. KCS84F, H, J, K)

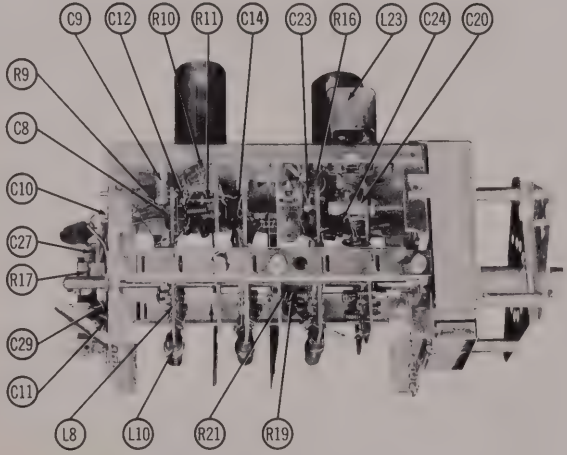
RCA VICTOR MODELS 24-S-512, U, 24-S-513, U, 24-S-514, U, 24-S-529, U, 24-S-531, U, 24-S-532, U (Ch. KCS84F, H, J, K)

CHASSIS TOP VIEW

RCA VICTOR MODELS 24-5-512, U, 24-5-513, U, 24-5-514, U, 24-5-529, U, 24-5-531, U, 24-5-532, U (Ch. KCS84F, H, J, K)



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V16) to disable the high voltage.

KRK32D OR KRK30D (OR E) ANTENNA MATCHING UNIT ALIGNMENT

The antenna unit has been properly aligned at the factory. The RF unit is aligned with a particular antenna matching unit in place. If a new antenna unit is installed, the RF unit should be realigned. The FM trap (A1) may be aligned without adversely affecting the unit.
Disconnect the lead from L7 (Point Ⓐ) to the channel selector switch. Use a short jumper to connect the output of the matching unit at point Ⓐ thru .001MFD capacitor to pin 1 (grid) of the second video IF amplifier (V4). Remove the first video IF amplifier tube (V3) from its socket.
The matching unit cover must be in place during alignment.
Connect the ends of a 1000Ω resistor across a 7.5 volt battery capable of withstanding considerable current drain. Connect the potentiometer arm to point Ⓑ. Connect the positive side to chassis. Adjust potentiometer arm for -5 volts at point Ⓑ
Connect the sychronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	Across antenna terminals	Not used	46.75MC (400~Mod)	Any	Vert. Amp. to point Ⓒ. Low side to chassis.	A2	Adjust for MINIMUM 400~ indication on scope.
2.	"	"	"	41.25MC	"	"	A3	"
3.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	52MC (20MC Swp)	50MC 52MC 53MC	"	Vert. Amp. thru detector (Fig. 2) to point Ⓐ.	A4, A5	Remove .001MFD capacitor from point Ⓐ to grid of V4. Connect a 300, ½ watt carbon resistor from point Ⓐ to chassis. Use very short leads. Adjust for response similar to Fig. 1 Repeat steps 1, 2 and 3 until no further improvement is noted. Remove 300Ω resistor and detector probe. Restore connection from L7 to channel switch. Replace V3 in its socket.

VIDEO IF ALIGNMENT (MODELS 24-S-529, 24-S-531 AND 24-S-532)

Turn AGC control maximum clockwise.
Connect the potentiometer arm of the bias supply to point Ⓑ. Connect positive side to chassis.
Adjust the potentiometer arm for -5 volts at point Ⓑ.
Attenuate signal generator output to maintain 3 volts at VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to terminal "A" and low side to terminal "B" of first video IF transformer (L2S).	Not used	44.5MC (Unmod)	Any non-interfering channel	Use VTVM. DC probe to point Ⓒ. Common to chassis.	A6	Adjust for maximum deflection.
5.	"	"	"	45.5MC	"	"	A7	"
6.	"	"	"	43.0MC	"	"	A8	"
7.	"	"	"	47.25MC	"	"	A9	Adjust for MINIMUM deflection.
8.	.0015MFD Ceramic Capacitor	High side to point Ⓓ. Low side to chassis. Use very short leads.	44MC (20MC Swp)	42.5MC 45.75MC 47.25MC	4	Vert. Amp. thru 10KΩ to point Ⓓ. Low side to chassis.	A10, A11, A12,	Connect 330Ω carbon resistors from plate to screen of 2nd and 3rd video IF amplifier tubes (V4 and V5). Connect 180Ω carbon resistor from plate to screen of first video IF amplifier (V3). Preset A10 to MINIMUM capacity. Couple the signal generator loosely to the detector (Fig. 2) to provide markers. Adjust A11 and A12 for maximum amplitude response curve with 45.75MC at 70% as in Fig. 3. Attenuate sweep generator output to maintain .3 to .5 volts peak to peak on scope for final adjustment. Adjust A10 to place 42.5MC marker at 70%. The 47.25MC marker should fall in trap notch (To view this marker temporarily reduce bias and increase marker generator output.) Remove the 180Ω and 330Ω resistors from V3, V4 and V5.
9.	"	"	"	42.5MC 45.0MC 45.75MC 46.5MC	4	Vert. Amp. thru 10KΩ to point Ⓓ. Low side to chassis.		Attenuate sweep generator output to maintain 3 volts peak to peak on scope. Couple signal generator loosely to grid of first video IF amp. to provide markers. SLIGHTLY retouch A6, A7 and A8 to obtain response similar to Fig. 4. Continue alignment with step 14.

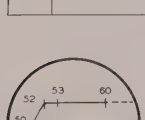


FIG. 1

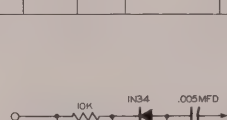


FIG. 2

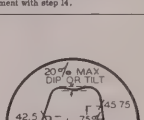


FIG. 3

RCA VICTOR MODELS 24-S-512, U, 24-S-513, U, 24-S-514, U, 24-S-529, U, 24-S-531, U, 24-S-532, U (Ch. KCS84F, H, J, K)

ALIGNMENT INSTRUCTIONS (cont)

VIDEO IF ALIGNMENT (MODELS 24-S-529U, 24-S-531U AND 24-S-532U)

Turn the AGC control maximum clockwise.
Connect the potentiometer arm of the bias supply to point ⊕, Connect the positive side to chassis. Adjust the potentiometer arm for -5 volts at point ⊖.
Attenuate signal generator output to maintain 3 volts at VTVM.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4	Direct	High side to terminal "A" and low side to terminal "B" of first video IF transformer.	Not used	44.5MC (Unmod)	Any non-interfering channel.	Use VTVM DC probe to point ⊖ Common to chassis.	A6	Adjust for maximum deflection.
5	"	"	"	46.5MC	"	"	A7	"
6	"	"	"	43.0MC	"	"	A8	"
7	"	"	"	47.25MC	"	"	A9	Adjust for MINIMUM deflection.
8	.001$5MFD ceramic capacitor	High side to point ⊕. Low side to chassis. Use very short leads.	44MC (20MC Swp)	43.5MC 45.75MC 47.25MC	4	Vert. amp. thru detector (Fig. 3) to pin 5 (plate) of first video IF amplifier tube.	A10, A11, A12	Connect 330Ω carbon resistors from plate to screen of 2nd and 3rd video IF amplifier tubes. Connect 180Ω carbon resistor from plate to screen of first video IF amplifier tube. Pre-set A10 to MINIMUM capacity. Couple the signal generator loosely to the detector (Fig. 3) to provide markers. Adjust A11 and A12 for maximum amplitude response curve with 45.75MC marker at 75% as in Fig. 3. Attenuate sweep generator output to maintain .3 to .5 volts peak to peak on scope for final adjustment. Adjust A10 to place 42.5MC marker at 70%. The 47.25MC marker should fall in trap notch. (To view this marker temporarily, reduce bias and increase marker generator output.) Remove the 180Ω and 330Ω carbon resistors from the first, second and third video IF amplifier tubes.
9	"	"	"	42.5MC 45.0MC 45.75MC 46.5MC	4	Vert. amp. thru 10KΩ to point ⊖. Low side to chassis.		Attenuate sweep generator output to maintain 3 volts peak to peak on scope. Couple signal generator loosely to grid of first video IF amplifier tube to provide markers. SLIGHTLY retouch A6, A7 and A8 to obtain response similar to Fig. 4.
10	1000Ω carbon resistor in series with .0015MFD	High side thru dummy to 1rost terminal of 1N82 crystal holder. Remove crystal cover and connect resistor end of dummy to crystal front holder. Insulate resistor lead.) Low side to tuner chassis. Use very short leads.	44MC (30MC Swp)	41.25MC 45.75MC	Between channels 83 & 69.	Vert. amp. thru detector (Fig. 3) to junction of 180Ω resistor and .0015MFD capacitor at point ⊖. (See remarks.)	A13, A14, A15, A16	Set change-over switch to "UHF" position. Connect a .0015MFD capacitor in series with a 180Ω carbon resistor from point ⊖ to chassis with the capacitor end connected to point ⊖. Connect signal generator loosely to detector (Fig. 3) to provide markers. Connect the potentiometer arm of a second bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust for -5 volts at tuner AGC terminal. Attenuate sweep generator output to maintain not more than .3 volts peak to peak on scope. Adjust A13 and A16 for maximum amplitude response curve similar to Fig. 5. If necessary, adjust A15 to place 45.75MC marker at peak of response curve. Adjust A16 for MINIMUM tilt. Remove the 180Ω resistor and .0015MFD capacitor from point ⊖.
11	"	"	"	"	"	Vert. amp. thru 10KΩ to point ⊖. Low side to chassis.		Attenuate sweep generator output to maintain 3 volts peak to peak on scope. If necessary, SLIGHTLY retouch A13 and A14 for response similar to Fig. 5.
12	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	42.5MC 45.0MC 45.75MC 46.5MC	13	Vert. amp. thru 10KΩ to point ⊖. Low side to chassis.		Couple signal generator loosely to grid of first video IF amplifier tube to provide markers. Check for response similar to Fig. 4. SLIGHTLY retouch A6 and A7 to correct for any overall tilt that is essentially the same on all VHF channels.
			207MC (10MC Swp)	"	12			
			201MC (10MC Swp)	"	11			
			195MC (10MC Swp)	"	10			
			189MC (10MC Swp)	"	9			
			183MC (10MC Swp)	"	8			
			177MC (10MC Swp)	"	7			
			85MC (10MC Swp)	"	6			
			79MC (10MC Swp)	"	5			
			69MC (10MC Swp)	"	4			
			63MC (10MC Swp)	"	3			
			57MC (10MC Swp)	"	2			
13	Remove VHF sweep generator and connect UHF sweep generator to antenna terminals. Check all UHF channels for response similar to Fig. 4. SLIGHTLY retouch A13 and A14 to correct any overall tilt. Disconnect generators and bias supplies.							

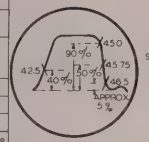


FIG. 4

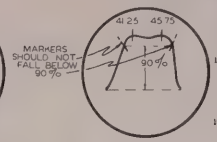


FIG. 5

FIG. 6

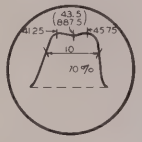


FIG. 7

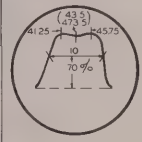
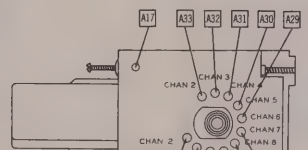


FIG. 8

FIG. 9

FIG. 10



KRK32D VHF TUNER ALIGNMENT (MODELS 24-S-529, 24-S-531, 24-S-532)

A tuner unit which is operative and requires only minor touch-up adjustments will require no pre-setting of adjustments. When complete alignment is necessary make the following adjustments.
Pre-set A17 all the way out. Set channel 7 to 13 oscillator slugs one turn from tight. Adjust A13 so that the slug is all the way out. Disconnect the link from terminals "A" and "B" of L25 and terminate the link with a 39Ω carbon resistor.
Tuner alignment as outlined below requires the use of a heterodyne frequency meter.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Direct	High side to point ⊕. Low side to chassis.	Not used	43.5MC (400∿Mod)	5	Vert. Amp. to point ⊖. Low side to chassis.	A18	Short the tuner AGC terminal to chassis. Adjust scope for maximum gain and signal generator for maximum output. Adjust for MINIMUM 400∿ indication on scope. Remove short from tuner AGC terminal.
15.		RF input of heterodyne frequency meter to end of insulated wire inserted in hole provided for adjustment of A31.	"	Set Freq. meter to 227MC	8	Not used	A19, A20, A31,	Connect the potentiometer arm of the bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust the potentiometer from -3 volts at tuner AGC terminal. Pre-set A19 for -3 volts on VTVM at point ⊖ (limits of oscillator injection voltage are 2 - 5.5 volts). Turn the fine tuning control fully clockwise. Adjust A20 for audible beat on freq. meter. Adjust A17 clockwise until beat note just begins to change, then turn one full turn in the same clockwise direction. Return fine tuning control to its mid-range position.
		NOTE: If channel 8 oscillator frequency cannot be reached by adjustment of A20 switch to channel 13 and adjust A23 for channel 13 oscillator frequency, then switch to channel 12 and adjust A23 for channel 12 oscillator frequency. Continue down to channel 8 adjusting proper oscillator trimmer to obtain proper oscillator frequency on each channel, Also, on channel 8, adjust A20 for channel 8 oscillator frequency. Switch to channel 13 and adjust A22, then switch back to channel 8 and adjust A20 again.						
16	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point ⊖. Low side to chassis.	A21, A34, A35, A36,	Adjust A21 maximum counter clockwise. If a separate marker generator is used connect it loosely to antenna terminals. Adjust scope for maximum gain and attenuate sweep generator output for a MINIMUM signal input that will provide usable pattern on scope. Adjust A21, A34, A35 and A36 for response similar to Fig. 8.
17.		Connect the DC probe of VTVM to point ⊖. Common to chassis. Adjust A19 for -3 volts at point ⊖. Readjust A17, A21, A34 and A35 for response similar to Fig. 6. Adjust A36 for maximum gain at mid-point of response curve. If necessary, repeat until desired response is obtained.						
18.		Connect frequency meter as in step 15.	Not used	Freq. meter to 227MC	13	Not used	A22	Turn fine tuning control fully clockwise. Adjust A22 for audible beat on freq. meter. SLIGHTLY overadjust the adjustment an additional turn in the same direction and then adjust A17 to again obtain an audible beat.
19.	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	213MC (20MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point ⊖. Low side to chassis.	A37, A38	Adjust for response similar to Fig. 8. Turn off generator and check oscillator injection voltage at point ⊖ with VTVM. Voltage should be within limits (2 -5.5volts). If A19 required readjustment turn sweep generator back on and recheck channel 13 response. If necessary, retouch A37 and A38 to obtain desired response.
20.		Connect frequency meter as in step 15.	Not used	Freq. meter to 227MC	8	Not used	A17	Check for audible beat on frequency meter. If necessary, readjust A17 for proper oscillator frequency.
21.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	183MC (30MC Swp)	181.25MC 185.75MC	8	Vert. Amp. to point ⊖. Low side to chassis.	A21, A34, A35, A36	If necessary, retouch A21, A34, A35 and A36 for response similar to Fig. 6. If A34 required adjustment turn off generator and switch back to channel 13 and check oscillator injection voltage at point ⊖ with VTVM. If the oscillator injection trimmer, A19, was far off it may be necessary to repeat steps 20 and 21 several times before proper setting of A19 is obtained.
22.		Connect frequency meter as in step 15.	Not used	Freq. meter to 129MC	6	Not used	A39	Set fine tuning control to its mid-range position. Adjust A39 for an audible beat on frequency meter.
23	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. Amp. to point ⊖. Low side to chassis.	A39, A40, A41	Adjust for response similar to Fig. 6. Check oscillator injection voltage at point ⊖ with VTVM. If necessary, readjust A39. If A39 required readjustment switch the receiver and generator to channel 8. Retouch A34 for response similar to Fig. 8. Recheck A17 and A20 for proper oscillator frequency as in step 15.
24.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check for response similar to Fig. 8. If markers fall below 80% on any low band channel retouch A39, A40 and A41 for best compromise. Check oscillator injection voltage at point ⊖ with VTVM on each low band channel. It should be within limits of 2-5.5 volts.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

RCA VICTOR MODELS 24-S-512, U, 24-S-513, U, 24-S-514, U 24-S-529, U, 24-S-531, U, 24-S-532, U (CH. KCS86, H, J, K)

ALIGNMENT INSTRUCTIONS (cont)

KRK32D VHF TUNER ALIGNMENT (MODELS 24-8-529, 24-8-531, 24-8-532) CONTINUED

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
25	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point Ⓥ. Low side to chassis.	A21, A34, A35	Check for response similar to Fig. 6. If markers fall below 80% retouch A21, A34 and A35 for best compromise on all high band channels. Check oscillator injection voltage on all high band channels at point Ⓥ with VTVM. It should be within limits of 3 - 5.5 volts.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
26		Connect frequency meter as in step 15.	Not used	Freq. meter to 217MC	13	Not used	A13	Adjust individual channel oscillator slug for audible beat on frequency meter on each channel. Check oscillator injection voltage on each channel at point Ⓥ with VTVM to verify that the voltage is within limits. Continue alignment with step 30.
				251MC	12		A23	
				245MC	11		A24	
				239MC	10		A25	
				233MC	9		A26	
				227MC	8		A27	
				221MC	7		A28	
				129MC	6		A29	
				123MC	5		A30	
				113MC	4		A31	
				107MC	3		A32	
				101MC	2		A33	

KRK30D (OR E) VHF TUNER ALIGNMENT (MODELS 24-8-529U, 24-8-531U AND 24-8-532U)

A tuner unit which is operative and requires only minor touch-up adjustments will require no pre-setting of adjustments. When complete alignment is necessary make the following adjustments.
Pre-set A17 all the way out. Set channel 7 to 13 oscillator slug one turn from tight. Adjust A13 so that the slug is all the way out.
Disconnect the link terminal from "A" and "B" of the first video IF transformer and terminate the link with a 39Ω carbon resistor.
Tuner alignment as outlined below requires the use of a heterodyne frequency meter.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14	Direct	High side to point Ⓐ. Low side to chassis.	Not used	43.5MC (400% Mod)	2	Vert. amp. to point Ⓥ. Low side to chassis.	A18	Short the tuner AGC terminal to chassis. Adjust scope for maximum gain and signal generator for maximum output. Adjust for MINIMUM 400~ indication on scope. Remove short from AGC terminal.
15		RF input of heterodyne frequency meter to end of insulated wire inserted in hold provided for adjustment of A21.	"	Set freq. meter to 327MC	8	Not used.	A19, A20, A17	Connect the potentiometer arm of the bias supply to the tuner AGC terminal. Connect the positive side to chassis. Adjust the potentiometer for -3 volts at the tuner AGC terminal. Pre-set A19 for -3 volts on VTVM at point Ⓥ. (Limits of oscillator injection voltage are 3-5.5 volts.) Turn the fine tuning control fully clockwise. Adjust A20 for audible beat on freq. meter. Adjust A17 clockwise until beat note just begins to change, then turn one full turn in the same clockwise direction. Return fine tuning control to its mid-range position.

NOTE: If channel 8 oscillator frequency cannot be reached by adjustment of A20, switch to channel 13 and adjust A22 for channel 13 oscillator frequency, then switch to channel 12 and adjust A23 for channel 12 oscillator frequency. Continue down to channel 8 adjusting proper oscillator trimmer to obtain proper oscillator frequency on each channel. Also, on channel 8, adjust A20 for channel 8 oscillator frequency. Switch to channel 13 and adjust A22 then switch back to channel 8 and adjust A20 again.

16	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	183MC	181.25MC 185.75MC	8	Vert. amp. to point Ⓥ. Low side to chassis.	A21, A34, A35, A36	Adjust A12 maximum counter clockwise. If a separate marker generator is used, couple it loosely to antenna terminals. Adjust scope for maximum gain and attenuate sweep generator output for a MINIMUM signal input that will provide usable indication on scope. Adjust A21, A34, A35 and A36 for response similar to Fig. 6.
17	Connect the DC probe of VTVM to point Ⓥ. Common to chassis. Adjust A19 for -3 volts at point Ⓥ. Readjust A17, A21, A34 and A35 for response similar to Fig. 6. Adjust A36 for maximum gain at mid-point of response curve. If necessary, repeat until desired response is obtained.							
18		Connect frequency meter as in step 15.	Not used.	Freq. meter to 257MC	13	Not used	A22	Turn fine tuning control fully clockwise. Adjust A22 for audible beat on frequency meter. SLIGHTLY overshoot the adjustment an additional turn in the same direction and then adjust A17 to again obtain an audible beat.
19	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. to point Ⓥ. Low side to chassis.	A37, A36	Adjust for response similar to Fig. 6. Turn off generator and check oscillator injection voltage at point Ⓥ with VTVM. Voltage should be within limits (3-5.5 volts). If A19 required readjustment turn sweep generator back on and recheck channel 13 response. If necessary, retouch A37 and A38 to obtain desired response.
20		Connect frequency meter as in step 15.	Not used.	Freq. meter to 227MC	8	Not used	A17	Check for audible beat on frequency meter. If necessary, readjust A17 for proper oscillator frequency.
21	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	183MC (10MC Swp)	181.25MC 185.75MC	8	Vert. amp. to point Ⓥ. Low side to chassis.	A21, A34, A35, A36	If necessary, retouch A21, A34, A35 and A36 for response similar to Fig. 6. If A34 required adjustment, turn off generator and switch back to channel 13 and check oscillator injection voltage at point Ⓥ with VTVM. If the oscillator injection trimmer (A19) was far off, it may be necessary to repeat steps 20 and 21 several times before proper setting of A19 is obtained.

ALIGNMENT INSTRUCTIONS (cont)

KRK30D (OR E) VHF TUNER ALIGNMENT (MODELS 24-S-529U, 24-S-531U AND 24-S-532U) CONTINUED

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
22		Connect frequency meter as in step 15.	Not used	Frequency meter to 129MC.	6	Not used.	A29	Set fine tuning control to its mid-range position. Adjust A29 for an audible beat on frequency meter.
23	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. amp. to point ⑳. Low side to chassis.	A39, A40, A41	Adjust for response similar to Fig. 6. Check oscillator injection voltage at point ⑳ with VTVM. If necessary, readjust A39. If A39 required readjustment, switch the receiver and generator to channel 6. Retouch A36 for response similar to Fig. 6. Recheck A17 and A20 for proper oscillator frequency as in step 15.
24	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"		Check for response similar to Fig. 6. If markers fall below 80% on any low band channel, retouch A39, A40 and A41 for best compromise. Check oscillator injection voltage at point ⑳ with VTVM on each low band channel. It should be within limits of 2-5. 5 volts.
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			65MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
25	Two 130Ω carbon resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. to point ⑳. Low side to chassis.	A21, A34, A35	Check for response similar to Fig. 8. If markers fall below 80%, retouch A21, A34 and A35 for best compromise on all high band channels. Check oscillator injection voltage on all high band channels at point ⑳ with VTVM. It should be within limits of 2-5. 5 volts.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
26		Connect frequency meter as in step 15.	Not used.	Frequency meter to 257MC	13	Not used.	A22	Adjust individual channel oscillator slug for audible beat on frequency meter on each channel. Check oscillator injection voltage on each channel at point ⑳ with VTVM to verify that the voltage is within limits.
				251MC	12		A23	
				245MC	11		A24	
				239MC	10		A25	
				233MC	9		A26	
				227MC	8		A27	
				221MC	7		A28	
				129MC	6		A10	
				123MC	5		A30	
				115MC	4		A31	
				107MC	3		A32	
				101MC	2		A33	

KRK30D (OR E) UHF TUNER ALIGNMENT (MODELS 24-S-529U, 24-S-531U, 24-S-532U)

RF adjustments require removal of the tuner shield, therefore the UHF section must be removed from the tuner assembly for RF alignment. The tuner need not be removed for IF and oscillator adjustments.
Connect a 100Ω carbon resistor from the center conductor of the IF cable to chassis (point ⑮ on schematic). If the oscilloscope does not have a sensitivity of 5 millivolts per inch a suitable pre-amplifier may be used.
Fabricate a test dial with marks scribed on its circumference at 0, 5 and 164 degrees. The dial should be made to fit over the split gear on the tuner shaft for accurate alignment. Locate the 0 degree reference point with the capacitor plates fully meshed. The stop pin on the tuner should be against the stop plate on the gear assembly when the plates are fully meshed.
Connect the high side of the VHF marker signal generator thru a 1000Ω carbon resistor to point ⑭. Insert resistor lead (insulate lead) thru aperature provided for crystal removal. Connect low side to chassis.
Couple the UHF marker generator loosely to the UHF antenna terminals.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
27	Two 130Ω Carbon Resistors	Across UHF antenna terminals with 130Ω in each lead.	887.5MC (Use max. sweep width)	41.25MC 43.5MC 45.75MC 887.5MC	83 (264° on tuning dial)	Vert. Amp. (thru pre-amp, if needed) to point ⑳. Low side to tuner chassis.	A42, A43, A44	Adjust A42 and A43 for maximum amplitude overcoupled response curve centered at 887.5MC similar to Fig. 7. Adjust A44 until the 43.5MC marker coincides with the 887.5MC marker. The 41.25MC and 45.75MC markers should be symmetrically located on top of response curve as in Fig. 7.
28	"	"	473.5MC (Use max. sweep width)	41.25MC 43.5MC 45.75MC 473.5MC	36 (9° on tuning dial)	"	A45, A46	Adjust A45 until 43.5MC marker coincides with 473.5MC marker as in Fig. 8.

29. Tune thru entire UHF range and check tracking. If the 41.25MC and 45.75MC markers fall below 70% on any UHF channel it will be necessary to bend the RF plates to correct this mistracking. The plates may be bent by using a knife blade with the tuner shield cover removed. Knife the plates while tuning lower in frequency so that tracking above the point of knifing will not be disturbed. A check of the section requiring knifing may be made by touching the plates with the knifing tool while noting the effect on the response curve, then knifing the proper section or both sections if required. Connect the DC probe of the VTVM to point ⑳. Common to chassis. Tune thru the entire UHF range at the same time noting the reading on the VTVM. Readings between .03 and .35 volts should be obtained. If voltages outside this limit are obtained it indicates low B+ voltage, low or high crystal impedance or an oscillator tube outside allowable limits. Connect the DC probe of VTVM to point ⑳. Common to chassis. Readings between .5 and 2.5 volts should be obtained. Readings outside this range will cause crystal currents beyond allowable limits and in such cases the oscillator tube should replaced. If the oscillator tube is replaced steps 27 and 28 should be repeated.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
30	.01MFD	High side to pin 1 (grid) of first sound IF amplifier tube (V9). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point ⑳. Common to chassis.	A47, A48	Adjust for maximum deflection. Attenuate generator output to maintain 6 volts at VTVM for final adjustments.
31	"	"	"	"	DC probe to point ⑳. Common to chassis.	A49	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Repeat steps 30 and 31 until no further improvement is noted.

RCA VICTOR MODELS 24-S-512, U; 24-S-513, U; 24-S-514, U; 24-S-529 U; 24-S-531, U; 24-S-532, U (Ch. KCS84F, M, J, K)

ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 4500KC sweep. Use 120v sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
30.	.01MFD	High side to pin 1 (grid) of first sound IF amplifier tube (V9). Low side to chassis.	4.5MC (4500KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point ⊗. Low side to chassis.	A47, A48	Disconnect stabilizing capacitor C62. Adjust for curve of maximum amplitude and symmetry similar to Fig. 9.
31.	"	"	"	"	"	Vert. Amp. to point ⊗. Low side to chassis.	A49	Reconnect stabilizing capacitor C62. Adjust so that 4.5MC occurs at center of cross-over lines as in Fig. 10. SLIGHTLY re-touch A46 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
32.	100Ω Resistor	High side to pin 2 (grid) of video detector (12AU7 V6). Low side to chassis	Not used	4.5MC (4500kcMod)	Any	Vert. Amp. thru detector (Fig. 1) to pin 9 (plate) of video output (12AU7 / V8).	A50	Short pin 1 (grid) of 3rd. video IF amplifier (V5) to chassis. Adjust for MINIMUM 400% indication on scope. Remove short from pin 1 of V5.

ALTERNATE 4.5MC TRAP ALIGNMENT

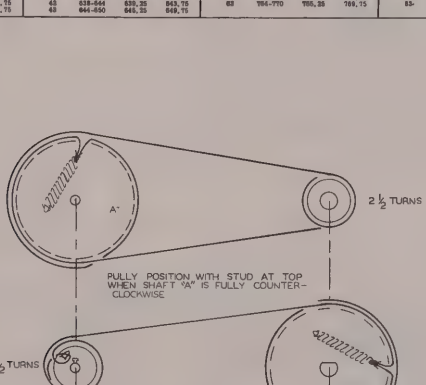
Restore set to normal operating condition and tune in a TV station. Inspect the picture for evidence of 4.5MC beat interference. If a 4.5MC beat is noted, turn fine tuning control slightly clockwise to emphasize the 4.5MC beat then adjust A50 to minimize the 4.5MC interference.

FM TRAP ALIGNMENT

Tune in a station on which FM interference is noted and adjust A1 to minimize the interference in the picture.

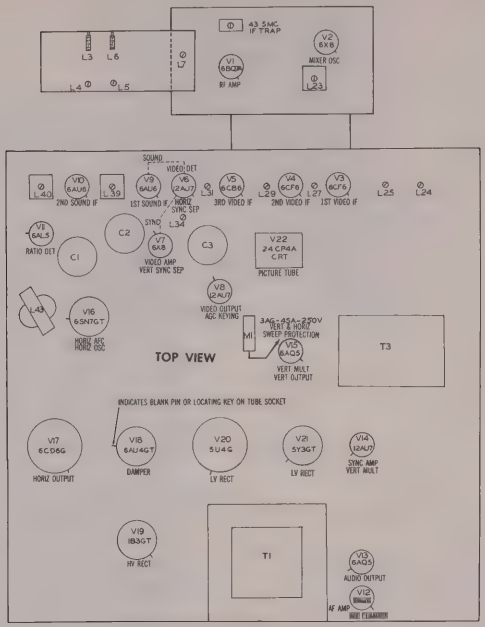
TELEVISION CHANNEL FREQUENCIES

Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier
2	54-60	55.25	59.75
3	60-66	61.25	65.75
4	66-72	67.25	71.75
5	76-82	77.25	81.75
6	82-88	83.25	87.75
7	174-180	175.25	179.75
8	180-186	181.25	185.75
9	186-192	187.25	191.75
10	192-198	193.25	197.75
11	198-204	199.25	203.75
12	204-210	205.25	209.75
13	210-216	211.25	215.75
14	470-476	471.25	475.75
15	476-482	477.25	481.75
16	482-488	483.25	487.75
17	488-494	489.25	493.75
18	494-500	495.25	499.75
19	500-506	501.25	505.75
20	506-512	507.25	511.75
21	512-518	513.25	517.75
22	518-524	519.25	523.75
23	524-530	525.25	529.75
24	530-536	531.25	535.75
25	536-542	537.25	541.75
26	542-548	543.25	547.75
27	548-554	549.25	553.75
28	554-560	555.25	559.75
29	560-566	561.25	565.75
30	566-572	567.25	571.75
31	572-578	573.25	577.75
32	578-584	579.25	583.75
33	584-590	585.25	589.75
34	590-596	591.25	595.75
35	596-602	597.25	601.75
36	602-608	603.25	607.75
37	608-614	609.25	613.75
38	614-620	615.25	619.75
39	620-626	621.25	625.75
40	626-632	627.25	631.75
41	632-638	633.25	637.75
42	638-644	639.25	643.75
43	644-650	645.25	649.75
44	650-656	651.25	655.75
45	656-662	657.25	661.75
46	662-668	663.25	667.75
47	668-674	669.25	673.75
48	674-680	675.25	679.75
49	680-686	681.25	685.75
50	686-692	687.25	691.75
51	692-698	693.25	697.75
52	698-704	699.25	703.75
53	704-710	705.25	709.75
54	710-716	711.25	715.75
55	716-722	717.25	721.75
56	722-728	723.25	727.75
57	728-734	729.25	733.75
58	734-740	735.25	739.75
59	740-746	741.25	745.75
60	746-752	747.25	751.75
61	752-758	753.25	757.75
62	758-764	759.25	763.75
63	764-770	765.25	769.75
64	770-776	771.25	775.75
65	776-782	777.25	781.75
66	782-788	783.25	787.75
67	788-794	789.25	793.75
68	794-800	795.25	799.75
69	800-806	801.25	805.75
70	806-812	807.25	811.75
71	812-818	813.25	817.75
72	818-824	819.25	823.75
73	824-830	825.25	829.75
74	830-836	831.25	835.75
75	836-842	837.25	841.75
76	842-848	843.25	847.75
77	848-854	849.25	853.75
78	854-860	855.25	859.75
79	860-866	861.25	865.75
80	866-872	867.25	871.75
81	872-878	873.25	877.75
82	878-884	879.25	883.75
83	884-890	885.25	889.75



UHF DRIVE CORD STRINGING

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

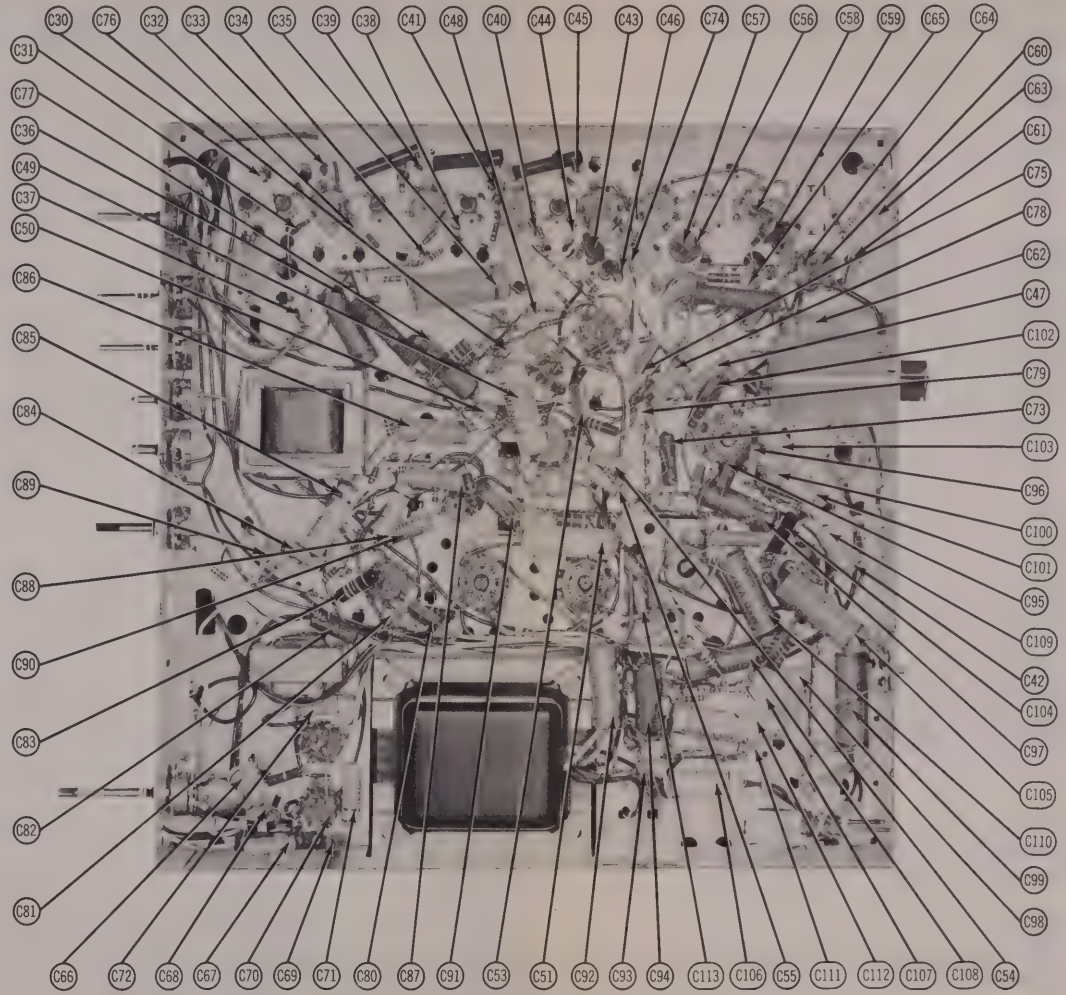
The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V20, V21

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V8, V22
Has pic, no sound - V8, V10, V11, V12, V13
Overloaded picture - V8, V12

SYNC FAILURE
No vert. sync - V7, V14
No horiz. sync - V6, V14, V16
No vert. or horiz. sync - V14

SWEEP FAILURE
No raster, has sound - V16, V17, V18, V19, V22, Fuse (M1)
No vertical deflection - V14, V15
Poor vert. linearity or foldover - V14, V15
Poor horiz. linearity or foldover - V16, V17, V18
Narrow picture - V16, V17, V18, V19, V20, V21
Vert. off freq. - V7, V14
Horiz. off freq. - V6, V14, V16

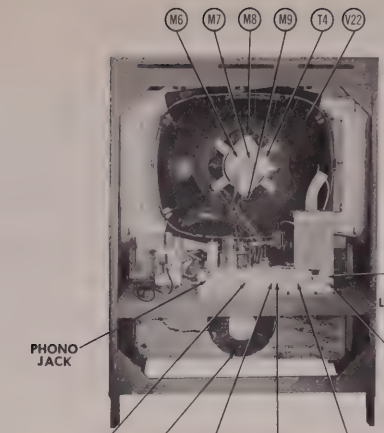


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

F
L. F
3924 MEADE S
DENVER, COLORADO

RCA VICTOR MODELS 24-5-512, U, 24-5-513, U, 24-5-514, U, 24-5-527, U, 24-5-531, U, 24-5-532, U (Ch. KCS847, M, J, K)

DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station preferably a test pattern.

HORIZONTAL FREQUENCY ADJUSTMENT
If picture cannot be synchronized with the horizontal hold control, adjust the horizontal frequency slug (B1) until the picture synchronizes. If picture still will not synchronize adjust the horizontal waveform slug (B2) several turns out of the coil and readjust B1 to synchronize the picture.
If picture width or linearity is incorrect adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without the presence of a vertical white line near the center of the picture. Adjust the horizontal linearity (B5) for a picture that is symmetrical from left to right without the presence of a vertical white line on the right side of the raster. Adjust the width coil (B4) for a picture slightly wider than necessary to fill the picture mask horizontally.

HORIZONTAL WAVEFORM ADJUSTMENT
The horizontal waveform adjustment is made at the factory and normally will require no adjustment.
Connect the vertical amplifier of an oscilloscope to terminal "C" of L41. Connect the low side to chassis. Turn the horizontal hold control 1/4 turn from its fully clockwise position so that the picture is still in sync.
Adjust the horizontal waveform slug (B2) for a response similar to Fig. 11 with the broad and narrow peaks of equal height. If necessary keep the picture in sync with the horizontal hold control while adjusting B2.

ALTERNATE HORIZONTAL WAVEFORM ADJUSTMENT
Set the horizontal hold control fully clockwise. B1 and B2 must be adjusted simultaneously. Adjust B1 until picture falls out of sync and 3 or 4 diagonal bars sloping down to the right appear on the screen. Adjust B2 clockwise while adjusting B1 to maintain the 3 or 4 diagonal bars on the screen. Continue adjusting B1 and B2 simultaneously until motorboating occurs, then adjust B2 counter clockwise until the motorboating just stops.
To check for proper operation adjust B1 until the picture synchronizes then adjust B1 in the opposite direction until the picture loses sync. Continue adjusting B1 in the same direction. No more than 3 or 4 diagonal bars should appear on the screen before motorboating occurs. If necessary, slightly retouch B2 until this condition is obtained.

HORIZONTAL LOCKING RANGE ADJUSTMENT
With the horizontal hold control in full counter clockwise position, momentarily interrupt the signal by switching off channel and back again. If picture remains in sync turn B1 slightly and again switch off channel, repeating procedure until picture loses sync with diagonal bars sloping down to the left. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync. If the number is more than 3, adjust the horizontal locking range trimmer (B6) slightly clockwise. If the number is less than 2 adjust B6 slightly counter clockwise. Recheck as above for the least number of diagonal bars present just before the picture falls into sync. Repeat above procedure until 2 or 3 bars are present.
Turn the horizontal hold control fully clockwise and adjust B1 until the diagonal bar sloping down to the right appears on the screen, then reverse direction of adjustment of B1 until the diagonal bar just disappears, leaving the picture in synchronization.

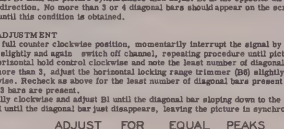


FIG. 11

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V17, V18, V20 and V21. Check adjustments B3, B4 and B5. Check T2, T4A, R118, R119, C109 and other associated components.

DRIVE LINES

Check by substitution V17 and V18. Check adjustments B3 and B5. Check C109, R118, R119, T2, T4A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V17 and V18. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V16, V17 and V18. Check C98 and C97 for open. Check L41, R110, C102, C103 and other associated components.

XMAS TREE EFFECT

Check by substitution V16, V17 and V18. Check T2 and T4A for internal arcing. Check L41, C103, C109, R113 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V14and V15. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T3, T4B, C91 and other associated components.	Check C90, C82, C83, C84, R89, R3, R121 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V14 and V15. Check height and vertical linearity controls. Check T3, T4B, R89 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V14 and V15. Check R121, R89, R3, C84, T3 and other associated components.

COMPRESSED AT TOP

Check by substitution V14 and V15. Check R97, R4, R88, C90, T3, T4B and other associated components.

FOLDS

Check by substitution V14 and V15. Check C84, C86, C85, R92, R93, R94, R97 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V6, V7 and V14. Check C73, C75, C77, C76, C78, R74, R75, R79, R80, R84 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V14. Check C82, C83, R97, R5, R86 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V16. Check L41, C80, C100, C102, R111, R6, R105 and other associated components.

HORIZONTAL BINDING

Check by substitution V8, V6, V7, V14 and V16. Check components associated with V16.

VIDEO

LOSS OF VIDEO

Check by substitution V7 and V8. Check C46, C48, C49, C51, L37, L35, R43, R44, R48 and other associated components.

SOUND BARS (4.5mC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A50. Check video IF alignment.

POOR CONTRAST

Check by substitution V7 and V8. Check contrast control. Check L33, L38, R46, R47, C3C and C 48. Check video detector network. Check picture tube.

NEGATIVE PICTURE

Check by substitution V7 and V8. Check picture tube. Check video detector network. Check L32, L35, L38, C48, R43 and other associated components.

SMEAR

Check by substitution V7 and V8. Check L35, L38, R43, C48, C49, C51 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6, V7 and V8 for heater to cathode leakage. Check B+ filter and decoupling network.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11, V12 and V13. Check stages V12 and V13 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value. Check TV and phono switch for TV position.	Check C66, C68, C71, C72, C2B, C1B, R7L, R70, R86, T7, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A49. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check by substitution V20 and V21. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check by substitution V20 and V21. Check B+ filter and decoupling network.

TROUBLE SHOOTING AIDS (cont)

DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V16, V17, V18 and V19. Check M1 fuse. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check C113, C112, C111, C110, R118, R119, T2, T4A, T5, T6 and other associated components.	Check L41, C109, C103, C102, C100, R113 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16, V17, V18, V20 and V21. Check adjustments B3, B4, and B5. Check C109, R118, R119, T2, T4A and other associated components.

BLOOMING

Check by substitution V17, V18, V19, V20 and V21. Check T2, T4A, C109, R118, R119 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V8. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

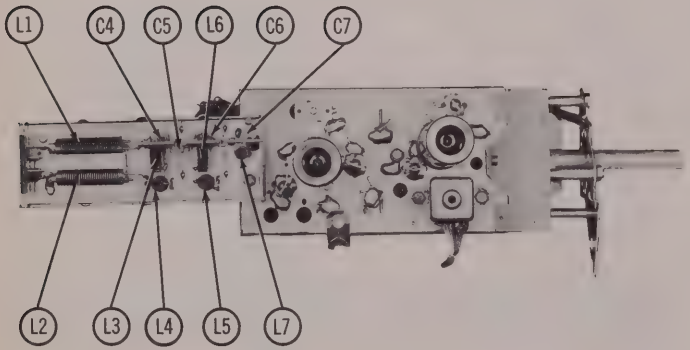
KEYSTONE EFFECT

Check T4 and its associated components.

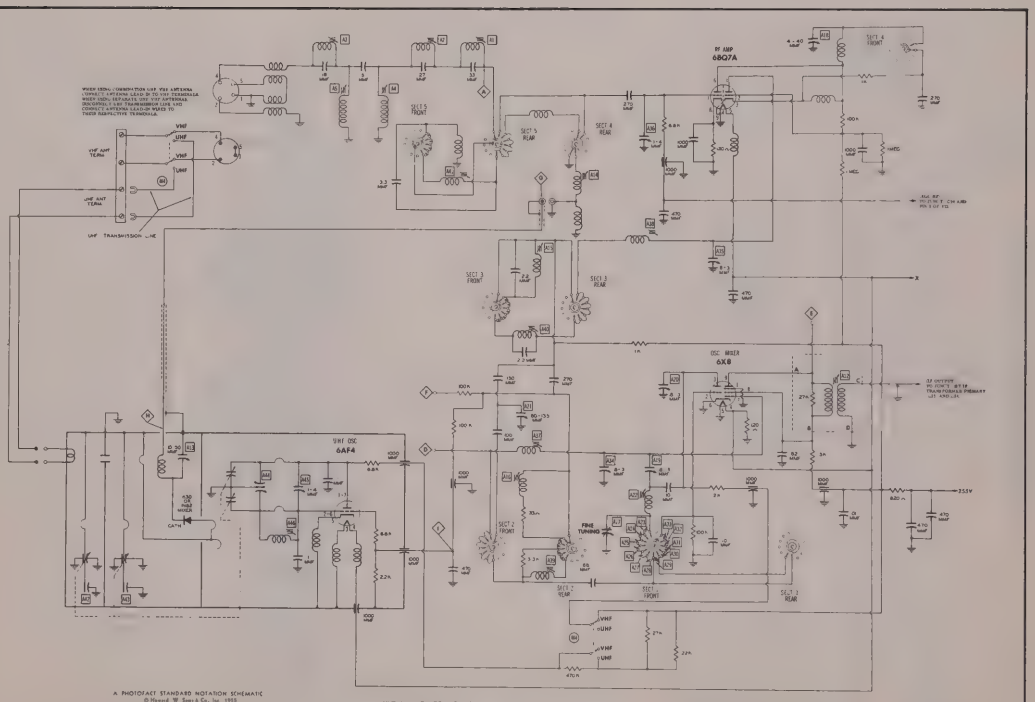
INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



TUNER TOP VIEW

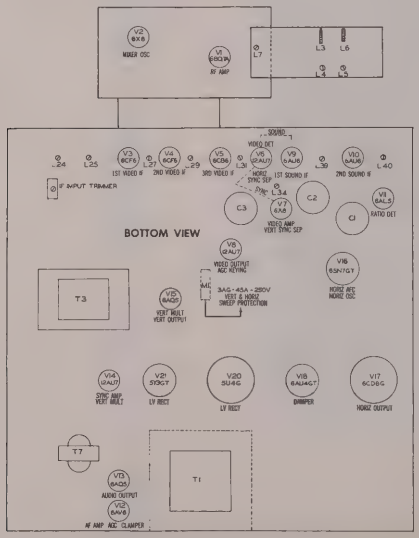


ALTERNATE TUNER SCHEMATIC

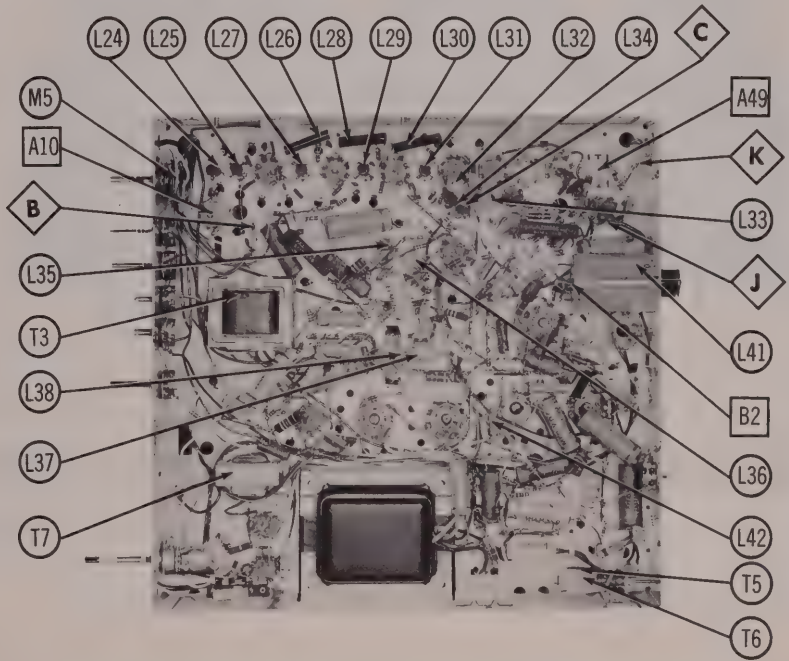
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	†1.8KΩ	†500KΩ	†500KΩ	0Ω	.1Ω	†500KΩ	380KΩ	120Ω	0Ω
V 2	6X8	0Ω	100KΩ	††3.8KΩ	.1Ω	0Ω	0Ω	100KΩ	†16KΩ	†16KΩ
V 3	6CF6	45KΩ	68Ω	0Ω	.1Ω	†4.8KΩ	†4.8KΩ	0Ω		
V 4	6CF6	45KΩ	33Ω	0Ω	.1Ω	†4.8KΩ	†4.8KΩ	0Ω		
V 5	6CB6	.2Ω	180Ω	.1Ω	0Ω	††3.8KΩ	††3.8KΩ	0Ω		
V 6	12AU7	2Meg	3.9KΩ	.3Ω	.1Ω	.1Ω	†5.6KΩ	†40KΩ	680KΩ	0Ω
V 7	6X8	0Ω	2.5Meg	†1.4Meg	.1Ω	0Ω	120Ω	3.9KΩ	†6.5KΩ	†18KΩ
V 8	12AU7	250KΩ	4Meg	†4KΩ	.1Ω	.1Ω	†7.5KΩ	470KΩ	3KΩ	0Ω
V 9	6AU6	1Ω	0Ω	0Ω	.1Ω	†4KΩ	†4KΩ	82Ω		
V 10	6AU6	120KΩ	0Ω	0Ω	.1Ω	†10KΩ	†5.3KΩ			
V 11	6AL5	10KΩ	10KΩ	0Ω	.1Ω	INF	0Ω	INF		
V 12	6AV6	10Meg	0Ω	0Ω	.1Ω	350KΩ	350KΩ	†330KΩ		
V 13	6AQ6	470KΩ	560Ω	0Ω	.1Ω	††2.2KΩ	†1.8KΩ	470KΩ		
V 14	12AU7	††2KΩ	1.6Meg	0Ω	.1Ω	.1Ω	●2.5Meg	1.6Meg	0Ω	0Ω
V 15	6AQ5	1.7Meg	0Ω	.1Ω	0Ω	†600Ω	†40Ω	1.7Meg		
V 16	6BN7GT	1.8Meg	†40KΩ	400KΩ	480KΩ	†60KΩ	0Ω	.1Ω	0Ω	
V 17	6CD6G	INF	.1Ω	47Ω	INF	1Meg	1Meg	0Ω	†15KΩ	Top Cap ●3.5Ω
V 18	6AU4GT	INF	INF	1Meg	INF	†65Ω	INF	0Ω	1Ω	
V 19	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ●410Ω
V 20	5U4G	INF	50KΩ	INF	1Ω	INF	10Ω	INF	50KΩ	
V 21	5Y3GT	INF	50KΩ	INF	10Ω	INF	1Ω	INF	50KΩ	
V 22	24CP4A	0Ω	470KΩ	PIN 10 ●350KΩ	PIN 11 †120KΩ	PIN 12 .1Ω				

† MEASURED FROM PIN 8 OF V20.
● MEASURED FROM PIN 3 OF V18.

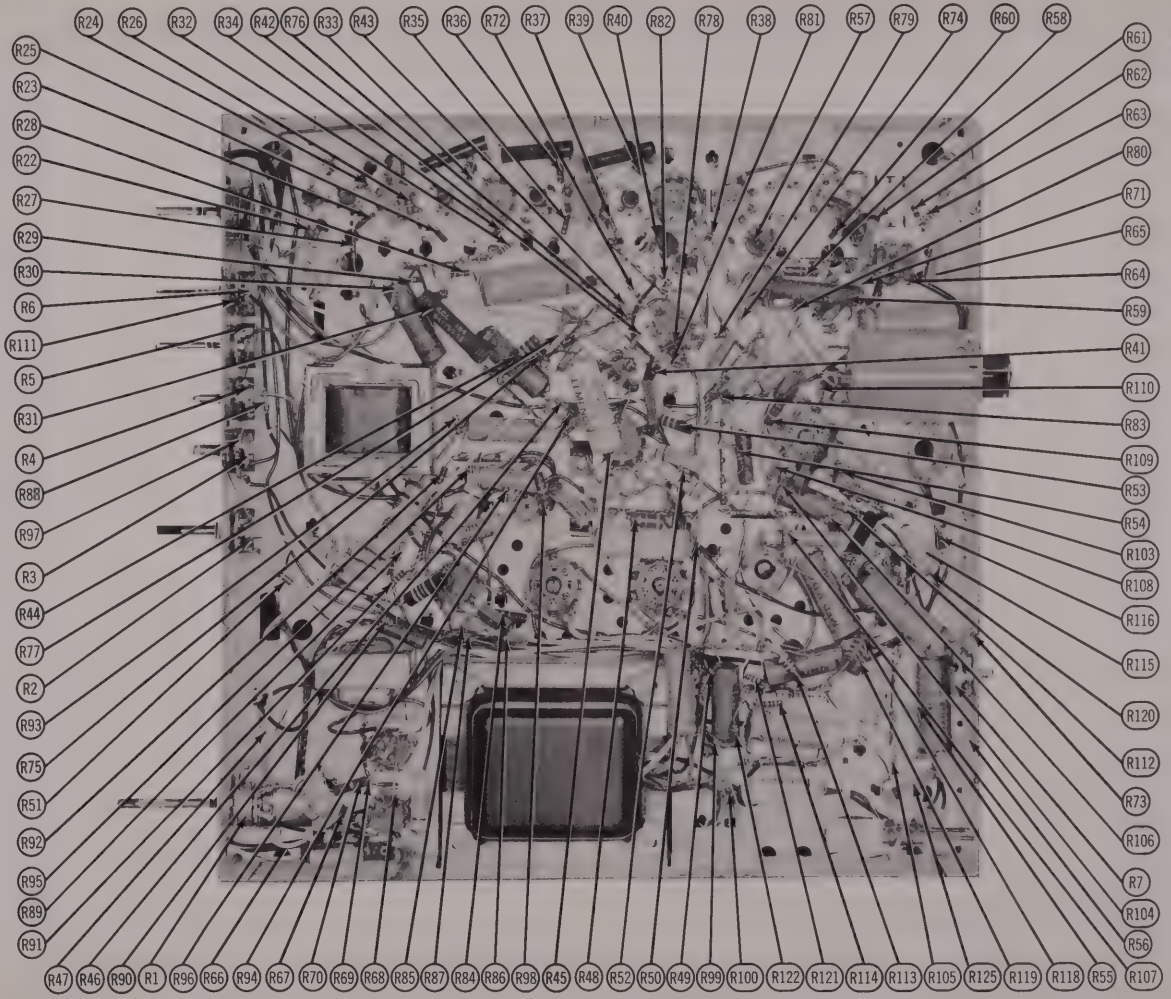


TUBE PLACEMENT CHART



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

RCA VICTOR MODELS 24-S-512, U,
24-S-513, U, 24-S-514, U, 24-S-529, U,
24-S-531, U, 24-S-532, U (CH. KCS84F, H, J, K)



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

-HF
ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BQ7A	6BQ7A	9AJ	
V2	Mixer - Osc.	6X8	6X8	9AK	
V3	1st. Video IF Amp.	6CF6	6CF6		
V4	2nd. Video IF Amp.	6CF6	6CF6		
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Detector-Horiz. Sync Sep.	12AU7	12AU7	9A	
V7	Video Amplifier-Vert. Sync Sep.	6X8	6X8	9AK	
V8	Video Output-AGC Keying	12AU7	12AU7	9A	
V9	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V10	2nd. Sound IF Amp.	6AU6	6AU6	7BK	
V11	Ratio Detector	6AL5	6AL5	6BT	
V12	AF Amplifier-AGC Clamper	6AV6	6AV6	7BT	
V13	Audio Output	6AQ5	6AQ5	7BZ	
V14	Sync Amplifier-Vert. Mult.	12AU7	12AU7	9A	
V15	Vert. Mult.-Vert. Output	6AQ5	6AQ5	7BZ	
V16	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V17	Hor is. Output	6CD6G	6CD6G	5BT	
V18	Damper	6AU4GT	6AU4GT	4CG	
V19	HV Rectifier	1B3GT	1B3GT	2C	
V20	LV Rectifier	5U4G	5U4G	5T	
V21	LV Rectifier	5Y3GT	5Y3GT	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	RCA Victor PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V22	24CP4A	24CP4A 24TP4	24CP4A 24CP4	24CP4A 24CP4		12N 12N 12N	

RCA VICTOR MODELS 24-5-512, U; 24-5-513, U; 24-5-514, U; 24-5-529, U; 24-5-531, U; 24-5-532, U (Ch. KC584F, H, J, K)

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲80	400	77654	AFH3-83		C036		FP345.3	TVL-2073	
B	▲20	400								
C2A	▲100	400	78213	AFH3-91		C153		FP356	TVL-3672	
B	▲20	50								
C3A	▲10	350	78213	AFH3-136		C153		FP330.15	TVL-3637	
B	▲5	350								
C	30	50								
C4	15			SI15	D6-150	TP12	GP1K-150	UC-5415	5GA-Q15	
C5	5			SI5	D6-050	TP05	GP1K-050	ZT-555	5GA-Y5	
C6	27			SI27	D6-270	TP28	GP1K-270	UC-5427	5GA-Q27	
C7	33			SI33NP0	TCZ-33	TZ33	NP0K-180			
C8	270		75199	SI270	D6-271	TP41	GP2K-271	UC-5327	5GA-Y27	
C9	1-4		78533		839-10		3115-01-10	CT951		
C10	1000		77084	EF-001	MFT-1000				503C-D1	
C11	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C12	1000		77252	BPD-001	DD-102	K080	501-001	DC-521	5HK-D1	
C13	1000		77253	BPD-001	DD-102	K080	501-001	DC-521	5HK-D1	
C14	1-4		78533		839-10		3115-01-10	CT951		
C15	270		75199	SI270	D6-271	TP41	GP1K-271	UC-5327	5GA-Y27	
C16	270		75199	SI270	D6-271	TP41	GP1K-271	UC-5327	5GA-Y27	
C17	470		75198	SI470	D6-471	TP46	GP1K-471	UC-5347	5GA-T47	
C18	.68		71504							
C19	10		77965	SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C20	.8-3		77823		839-3			CT-563A		
C21	.8-3		77823		839-3			CT-563A		
C22	10		73696	SI10N750	TCN-10	TN01	N750K-100	NT-541	5TCU-Q1	
C23	.8-3		77823		839-3			CT-565A		
C24	1000		77252	BPD-001	DD-102	K080	501-001	DC-521	5HK-D1	
C25	1000		77084	EF-001	MFT-1000				503C-D1	
C26	10000		73990	BPD-01	DD-103	K082	511-01	DC-511	5HK-S1	
C27	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C28	1000		77084	EF-001	MFT-1000				503C-D1	
C29	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C30	15		39044	SI15	D6-150	TP11	GP1K-150	UC-5415	5GA-Q15	
C31	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C32	470		78623	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C33	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C34	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C35	.47	200	78787	P288-47		PJPJP47		PT4047	2TM-P47	
C36	.22	200	78794	P288-22		PJPJP22		PT4022	2TM-P22	
C37	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C38	470		78822	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C39	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C40	1000		78623	BPD-001	DD-102	K080	501-001	DC-521	5HK-D1	
C41A	470		77873	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
B	470			BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C42	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C43	10000		73690	BPD-01	DD-103	K082	511-01	DC-511	5HK-S1	
C44	10		33098							
C45	470		77393	BPD-00047	DD-471	K060	501-00047	UC-5347	5GA-T47	
C46	47			SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C47	.0039	400	78618	P488-0039	D6-392	CUD4D39	GP3-333-392	PT4339	4TM-D39	
C48	47		39043	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C49	.1	600	73557	P688-1	DF-104	CUB6P1		PT601	5TM-P1	
C50	.0027	600	73559							
C51	.1	600	73557	P688-1	DF-104	CUB6P1		PT601	5TM-P1	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C53	100		76575	5H80	D6-161	TP37	GP2K-161	UC-5318	5GA-T15	
C53	680	500	78796	1478-681		1R5T68			MS-37	
C54	.0033	600	73546							
C55	.001	600	75349	P688-001	D6-102	CUB6D1	GP2L-102	PT631	6TM-D1	
C56	1000		73960	BPD-001	DD-102	K069	801-001	DC-531	5HK-D1	
C57	10000		73960	BPD-01	DD-103	K082	811-01	DC-511	5HK-81	
C58	10000		73960	BPD-01	DD-103	K082	611-01	DC-511	5HK-81	
C59	10000		73960	BPD-01	DD-103	K082	811-01	DC-511	5HK-81	
C60	470	500	39644	1479-501		5R5T47		MCE245	MS-35	
C61	470	500	39644	1479-501		5R5T47		MCE245	MS-35	
C62	.47	200	73787	P388-47		P2P47		PT4047	3TM-P47	
C63	.0022	600	73595	P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C64	470		77293	BPD-00047	DD-471	K060	801-00047	UC-5347	5GA-T47	
C65	470		77293	BPD-00047	DD-471	K060	801-00047	UC-5347	5GA-T47	
C66	.0047	400	79017	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47	
C67	.033	200	79015							
C68	.01	200	79014	P388-01	D6-103	P2B1	GP3-333-103	PT411	3TM-81	
C69	.0027	600	73599							
C70	270	500	47617	1469-271	TCZ-270	5R5T27	NP0-337-271	MCE240	5TCC-T27	
C71	.01	600	73561	P688-01	D6-103	CUB6B1	GP3-333-103	PT611	6TM-81	
C72	.0027	1000	79020							
C73	.001	600	78643	1479-102		1R5D1		MCB255	MS-31	
C74	.0039	600	78221	1464-392		1R5D39		MCB463	MS-24	
C75	270	500	78579	1469-271	TCZ-270	5R5T27	NP0-337-271	MCB241	MS-33	
C76	330	500	39640	1469-331		5R5T33		MCE241		
C77	.1	400	73551	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C78	.033	600	73563	P688-033		CUB6S33		PT4133	4TM-833	
C79	180		71993	5H80	D6-181	TP37	GP2K-181	UC-5318	5GA-T18	
C80	220	500	58271	1469-331	TCZ-220	5R5T22	NP0-334-221	MCE240		
C81	.0082	600	79019							
C82	.0027	600	73599	P688-0027	D6-272	CUB6D27	GP2-333-272	PT6227	6TM-D27	
C83	.0039	600	78321	1464-392		1R5D39		MCB463	MS-24	
C84	.01	600	73604							
C85	.047	600	73593							
C86	.068	200	79016							
C87	.027	600	75345							
C88	.015	600	73797							
C89	.0027	600	73599	1464-272		1R5D27				
C90	.022	600	73798	P688-022		CUB6S22		PT6122	6TM-S22	
C91	.001	1600	78980	P1688-001		CUB16D1		PT1621	MB-D1	
C92	.047	600	73592	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C93	.0047	400	79017	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47	
C94	.1	600	73551	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C95	82	500	76474	1469-820		2R5Q82				
C96	47	500	79063	1469-470	TCZ-47	2R5Q47	NP0L-470	MCB235	MS-45	
C97	.1	600	73551	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C98	.022	400	73582	P488-022		CUB4S22		PT4122	4TM-S22	
C99	.47	200	73787	P2B-47		P2P47		PT4047	3TM-P47	
C100	.047	400	73553	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C101	.001	600	75249	P688-001	D6-102	CUB6D1	GP2L-102	PT621	6TM-D1	
C102	330	500	76476	1469-331		5R5T33		MCE241		
C103	.01	600	73594							
C104	.001	600	75249	1479-102		1R5D1		MCB255	MS-31	
C105	.27	200	73786							
C106	.022	1000	73810	P1688-022		CUB16S22		PT6122	MB-S22	
C107	.1	600	73557							
C108	.1	400	73551	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C109	.00068	600	6479	1469-681		5R5T68			MS-37	
C110	.1	600	73557	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C111	.047	1000	73597							
C112	.047	1000	73597							
C113	270	500	79022	1469-271		5R5T27		MCE240	MS-33	
C114	120									

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA RCA Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	10KΩ	½	78309	*QJ-504	RTV-443	F1-25	UF14L	Contrast-Panel
B	1Meg	½				R2-57	UK16-T254 †	Volume tapped at 250KΩ-Rear
C	Switch					KB-1	US-26	Attach to R1B
R2A	200KΩ	½	78309	Q11-129	A47-200K-S	B-46	U-43	Brightness
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	3.5Meg	½	78806	B11-141	A47-3.5Meg-S	AB-86	SU-59	Height
B	Shaft		Not Req.	TM-3K1T	KS8-3	AK-1	Not Req.	Attach to R3A
R4A	2.5Meg	½	78807	B11-239	A47-2.5Meg-S	AB-83	SU-565	Vert. Linearity
B	Shaft		Not Req.	TM-3K1T	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	1.5Meg	½	78210	Q11-138	A47-2Meg-S	AB-75	U-155	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R5A
R6A	75KΩ	½	77639	Q11-125	A47-75K-S	AB-35	U-41	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R6A
R7A	500KΩ	½	78808	B11-133	A47-500K-S	AB-59	SU-50	AGC
B	Shaft		Not Req.	TM-2K1T	FKS-1/4	AK-1	Not Req.	Attach to R7A

* CONCENTRIKIT EQUIVALENT: KIT K-2, BASE ELEMENTS & SHAFTS B17-116 & P1-200 (PANEL)
B13-137X & R1-216 (REAR)
SWITCH 76-1

† Universal Replacement (Mallory exact duplicate part no. UE7758)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RCA Victor PART No.	IRC PART No.	NOTES
R8	1Meg	½	503510	BTS-1Meg	
R9	6800Ω	½	504268	BTS-6800	
R10	120Ω	½	503112	BTS-120	
R11	100KΩ	½	504410	BTS-100K	
R12	1Meg	½	503510	BTS-1Meg	
R13	1000Ω	½	502210	BTS-1000	
R14	100KΩ	½	504410	BTS-100K	
R15	12KΩ	2	523112	BTB-12K	
R16	15KΩ	2	523315	BTB-15K	
R17	820Ω	½	503182	BTS-820	
R18	120Ω	½	503112	BTS-120	
R19	3300Ω	½	502233	BTS-3300	
R20	100KΩ	½	502410	BTS-100K	
R21	100KΩ	½	502410	BTS-100K	
R22	1000Ω	½	502210	BTS-1000	
R23	15KΩ	½	502315	BTS-15K	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RCA Victor PART No.	IRC PART No.	NOTES
R24	68Ω 5%	½	502068	BTS-68 5%	
R25	1000Ω	½	502210	BTS-1000	
R26	56KΩ 5%	½	502356	BTS-56K 5%	
R27	1000Ω	½	502310	BTS-1000	
R28	150KΩ	½	502415	BTS-150K	
R29	180KΩ 5%	½	502418	BTS-180K 5%	
R30	1.5Meg 5%	½	502515	BTS-1.5Meg 5%	
R31	3800Ω	7	77671		
R32	43KΩ 5%	½	502343	BTS-43K 5%	
R33	33Ω 5%	½	502033	BTS-33 5%	
R34	1000Ω	½	502210	BTS-1000	
R35	56KΩ 5%	½	502356	BTS-56K 5%	
R36	180Ω 5%	½	502118	BTS-180 5%	
R37	470Ω	½	502147	BTS-470	
R38	3900Ω 5%	½	502339	BTS-3900 5%	
R39	47KΩ	½	502347	BTS-47K	
R40	12KΩ	½	502312	BTS-12K	
R41	120Ω	½	502112	BTS-120	
R42	5600Ω	½	502256	BTS-5600	
R43	12KΩ	½	502312	BTS-12K	
R44	18KΩ	2	522318	BTB-18K	
R45	470KΩ	½	502447	BTS-470K	
R46	180Ω	½	502118	BTS-180	
R47	270Ω	½	502127	BTS-270	
R48	7500Ω 5%	2	522275	BTB-7500 5%	
R49	100KΩ	½	502410	BTS-100K	
R50	470KΩ	½	502447	BTS-470K	
R51	220KΩ	½	502422	BTS-220K	
R52	3.9Meg	½	502539	BTS-3.9Meg	
R53	47KΩ	1	512347	BTA-47K	
R54	68KΩ	½	502368	BTS-68K	
R55	470KΩ	½	502447	BTS-470K	
R56	390KΩ	½	502439	BTS-390K	
R57	82Ω	½	502082	BTS-82	
R58	1000Ω	1	512310	BTA-1000	
R59	3300Ω	7	77670		
R60	1000Ω	½	502310	BTS-1000	
R61	10KΩ	2	522310	BTB-10K	
R62	47Ω	½	502047	BTS-47	
R63	39KΩ	½	502339	BTS-39K	
R64	10KΩ 5%	½	502310	BTS-10K 5%	
R65	10KΩ 5%	½	502310	BTS-10K 5%	
R66	12KΩ	½	502312	BTS-12K	
R67	10Meg	½	502610	BTS-10Meg	
R68	330KΩ	½	502433	BTS-330K	
R69	470KΩ	½	502447	BTS-470K	
R70	560Ω	1	512156	BTA-560	
R71	1800Ω	2	522218	BTB-1800	
R72	10KΩ	½	502310	BTS-10K	
R73	680KΩ	½	502468	BTS-680K	
R74	5600Ω	½	502256	BTS-5600	
R75	68KΩ	½	502368	BTS-68K	
R76	18KΩ	½	502318	BTS-18K	
R77	270KΩ	½	502427	BTS-270K	
R78	2.2Meg	½	502522	BTS-2.2Meg	
R79	39KΩ	½	502339	BTS-39K	
R80	1.2Meg	½	502512	BTS-1.2Meg	
R81	1.5Meg	½	502515	BTS-1.5Meg	
R82	3.9Meg	½	502539	BTS-3.9Meg	
R83	47KΩ	½	502347	BTS-47K	
R84	5600Ω	1	512256	BTA-5600	
R85	22KΩ	½	502322	BTS-22K	
R86	2200Ω 5%	½	502222	BTS-2200 5%	
R87	18KΩ	½	502318	BTS-18K	
R88	390KΩ 5%	½	502439	BTS-390K 5%	
R89	470KΩ	½	502447	BTS-470K	
R90	18KΩ	½	502318	BTS-18K	
R91	22KΩ	½	502322	BTS-22K	
R92	15KΩ 5%	½	502315	BTS-15K 5%	
R93	390KΩ	½	502439	BTS-390K	
R94	12KΩ	½	502312	BTS-12K	
R95	33KΩ 5%	½	502333	BTS-33K 5%	
R96	470KΩ	½	502447	BTS-470K	
R97	390KΩ 5%	½	502439	BTS-390K 5%	
R98	22KΩ 5%	1	512322	BTA-22K 5%	
R99	3300Ω	½	502233	BTS-3300	
R100	15KΩ	½	502315	BTS-15K	
R101	560Ω	½		BTS-560	
R102	560Ω	½		BTS-560	
R103	330KΩ	½	502433	BTS-330K	
R104	82KΩ	½	502382	BTS-82K	
R105	3900Ω	½	502239	BTS-3900	
R106	820KΩ	½	502482	BTS-820K	
R107	330KΩ	½	502433	BTS-330K	
R108	150KΩ 5%	1	512415	BTA-150K 5%	
R109	1.8Meg 5%	1	512518	BTA-1.8Meg 5%	
R110	15KΩ	½	502315	BTS-15K	
R111	100KΩ 5%	½	502410	BTS-100K 5%	
R112	150KΩ	½	502415	BTS-150K	
R113	47KΩ 5%	1	512347	BTA-47K 5%	
R114	820KΩ	½	502482	BTS-820K	
R115	47Ω	½	502047	BTS-47	
R116	1Meg	½	502510	BTS-1Meg	
R117	47Ω	3	78797	BTS-47	
R118	27KΩ	2	522327	BTB-27K	
R119	27KΩ	½	502327	BTS-27K	
R120	2.2Meg	½	502522	BTS-2.2Meg	
R121	270KΩ	½	502427	BTS-270K	
R122	56KΩ	½	502356	BTS-56K	
R123	1000Ω	½		BTS-1000	
R124	1.2Ω 5%	1/3	78795		
R125	100KΩ	2	502410	BTB-100K	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ② 1.89A	536VCT .270ADC	5VAC ④ 5A	78805	P-8187 ① ③		R-61BC ② ③			
		SEC. 3	SEC. 4	SEC. 5						
		6.3VAC ② 10A								

① Drill new mounting holes.
② Parallel and phase 6.3V windings for sec. #3.
③ Tape 6.3V 1.2A winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA RCA Victor PART No.	Halldorson PART No.	Merit PART No	RCA PART No	Ram PART No	Stancor TYPE No	Thordarson PART No	Triad PART No
T2	Horiz. Output Trans.	78810	FB419*①			X094 *①	A-8244 *	FLY-60 *	D-50 * ①
T3	Vert. Output Trans.	78809	Z1802 ④	A-3038 ④		V307 ④	A-8145 ④	26872 ④	A-108X ④
T4A	Yoke (90°) Horiz. (12MH)	78869 ③ ④	DF606	MDF-91⑥			DY-13A	Y-14	Y-50-1
B	Vert.(39MH)	79490 ⑤							
T5	Horiz. Lin. Coil (1.8-8.5MH)	76442	RF800⑦ ⑨	MWC-8⑦		20IR15	WC-8	WC-18 ⑦	WC-12 ⑧
T6	Width Coil (2.8-18MH)	76441	RF800⑦ ⑩	MWC-1⑦ ⑧		20IR16	WC-5⑦⑧	WC-18 ⑦	WC-12 ⑧

① Drill new mounting holes.
② Connect as auto transformers.
③ Used in Models 24-S-529, 24-S-529U, 24-S-532, 24-S-532U, 24-S-512, U, 24-S-513, U, 24-S-514U
④ Includes: 6 contact male connector, RCA part no. 51209, resistors R101, R102, R123, capacitor C114.
⑤ Deflection yoke for models 24-S-531, 24-S-531U.
⑥ Use original yoke damping network.
⑦ Enlarge mounting hole.
⑧ Connect to coded red and blue terminals.
⑨ Connect to terminals #3 and #4.
⑩ Connect to terminals #1 and #2.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	5	9			9	5	5	9
	4	7			7	4	4	7
	3	5			5	3	3	5
	2	3			3	2	2	3
	1	1			1	1	1	1
Connect Width Coil Across →	2 & 1	3 & 1			3 & 1	2 & 1	2 & 1	3 & 1

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No	NOTES
T7	7KΩ	3.4Ω	78997	A-3378 ①	A-3020	S-5X ①	21113 ①	26848	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA RCA Victor PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	10"	PM	3.4Ω	77777	10J11	10A31	① Used in models 24-S-512, U; 24-S-513, U;
	8"	PM	3.4Ω	77872 ①	8J9	8A21	and 24-S-514, U.

COILS (RF-IF)

ITEM No.	USE	DC RES PRI.	DC RES SEC.	REPLACEMENT DATA RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Matching Trans.	.6Ω	.6Ω	78396				Note 1
L2	Ant. Matching Trans.	.6Ω	.6Ω	78396				Note 1
L3	IF Trap	0Ω		78396				Note 1
L4	Ant. Shunt Coil	0Ω		78396				Note 1
L5	Ant. Shunt Coil	0Ω		78396				Note 1
L6	IF Trap	0Ω		78396				Note 1
L7	FM Trap	0Ω		78396				Note 1
L8	Ant. Coils	0Ω		78802				Includes stator complete with rotor, coils, (also L9-L10)
L9	Ant. Coil	0Ω		78803				Channel 13--Part of complete assembly
L10	Ant. Coil	0Ω		78803				Channel 6--Part of complete assembly
L11	Fil. Choke	0Ω		77308				
L12	Neut. Coil	0Ω		76562				
L13	IF Trap Coil	0Ω		78466				
L14	RF Coil	0Ω		78801				Channel 13--Part of complete assembly
L15	RF Coils	0Ω		78801				Includes stator complete with rotor, coils (also L14, L16) C15, R13
L16	RF Coil	0Ω		78801				Channel 6--Part of complete assembly.
L17	Fil. Choke	0Ω		79067				
L18	Mixer Grid Coil	0Ω		78800				Channel 13--Part of complete assembly
L19	Mixer Grid Coils	0Ω		78800				Includes stator complete with rotor, coils (also L18, L20) C17, C18, R19, R20, R21
L20	Mixer Grid Coil	0Ω		78800				Channel 6--Part of complete assembly
L21	Osc. Coil	0Ω		79068				Channel 13--Part of complete assembly
L22	Osc. Coils	0Ω		79068				Includes stator complete with rotor, coils (also L21) trimmer & C20
L23	Conv. Plate	.6Ω	.4Ω	78399				Includes 27KΩ resistor
L24	47.25MC trap	0Ω		78204	20-1047		6219*	
L25	1st Video IF	0Ω	.2Ω	78203	17-4523		6219	
L26	Fil. Choke	0Ω		73477	19-3001	TV-119	4604	1 Microhenry
L27	2nd Video IF	.2Ω	.2Ω	78433	17-4523		6219	
L28	Fil. Choke	0Ω		73477	19-3001	TV-119	4604	1 Microhenry
L29	3rd Video IF	.2Ω	.2Ω	78433	17-4523		6219	
L30	Fil. Choke	0Ω		73477	19-3001	TV-119	4604	1 Microhenry
L31	4th Video IF	.2Ω	.2Ω	78433	17-4523		6219	
L32	Series Peaking Coil	7Ω		75353	19-3125		6353	120 Microhenries
L33	Shunt Peaking Coil	10Ω		98462	19-3250	TV-185	6181	250 Microhenries
L34	4.5MC trap	2.9Ω		76983	20-1004	TV-151	1470	
L35	Series Peaking Coil	7Ω		77674	19-3250m	TV-185m	6181m	250 Microhenries; Wound on 27KΩ resistor
L36	Shunt Peaking Coil	10Ω		78232	19-3250a	TV-185a	6181a	250 Microhenries; Wound on 6800Ω resistor

RCA VICTOR MODELS 24-S-512, U, 24-S-513, U, 24-S-514, U, 24-S-529, U, 24-S-531, U, 24-S-532, U (Ch. KCS84F, H, J, K)

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L37	Shunt Peaking Coil	10.5Ω		75252	19-3500	TV-188	6174	500 Microhenries
L38	Series Peaking Coil	6.5Ω		71529	19-3125♦	TV-182	6178	120 Microhenries; Wound on 22KΩ resistor
L39	Sound IF	1.4Ω		76981	17-1071			
L40	Ratio Det.	10Ω	.2ΩCT	77112	17-1033	TV-110	1466	Tertiary winding = .3Ω
L41	Horiz. Osc.	115Ω		76440	20-1402	TV-183	6183	Waveform winding = 37Ω
L42	RF Choke	.72Ω		76640	19-1001		6604	1.5 Microhenries, IRC part no. CL-1

Note 1: Complete ant. matching trans. part no. 78396--includes L1, L2, L3, L4, L5, C4, C5, C6 and C7.
* Use one winding only.
■ Parallel with 27KΩ resistor.
▲ Parallel with 6.8KΩ resistor.
♦ Parallel with 22KΩ resistor.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000 ~	REPLACEMENT DATA: RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L43	.270A	38Ω	1.3HY	77676	C-2326 ①	C-2996①	C-23X ①	C5037①	28C44 ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: RCA Victor PART No. FUSE	RCA Victor PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	.45A 250V	78798	78218	312.500 (3A-3AG)	357001	AGC 45/100	4405

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M2	Dial Light	11891	Bayonet, #44
M3	Tuner	KRK22D	VHF--Models 24-S-529, 24-S-532, 24-S-531, 248-512, 513, 514
	Tuner	KRK30D	VHF-UHF--Models 24-S-529U, 248-532U, 24-S512U, 513U, 514U
	Tuner	KRK30E	VHF-UHF--Model 24-S-531U
M4	Switch	79374	VHF-UHF--Models 24-S-529U, 24-S-532U, 24-S-531U, 24-S-512U, 513U, 514U
M5	Switch	76311	TV-Phono-Tone
M6	Focus Magnet	77867	Includes centering device
M7	Ion Trap	76141	
M8	Correction Magnet	78556	
M9	Correction Magnet	78556	
A18	Trimmer Cap.	77616	43.5MC IF Trap (4-40MMF)
B3, B6	Trimmer Cap.	75217	2 Section - Horiz. Drive & Horiz. Lock (each section 10-160MMF)
A10	Trimmer Cap.	78220	IF Input (5-70MMF)
	Knob	75945	Brightness
	Knob	79465	Fine Tuning-UHF
	Knob	79464	Fine Tuning-VHF
	Knob	79133	TV-Phono-Tone Switch--Models 24-S-529, 24-S-529U, 24-S-532, 24-S-532U
	Knob	74978	TV-Phono-Tone Switch--Models 24-S-531, 24-S-531U, 24-S-512, U; 513, U; 514, U.
	Knob	79445	On-Off-Volume--For Oak, Blonde Tropical Hardwood & Birch Instruments.
	Knob	79471	On-Off-Volume--For Mahogany, Ebony & Maroon instruments
	Knob	79470	Contrast--For Mahogany, ebony & maroon instruments
	Knob	79444	Contrast--For oak, blonde tropical hardwood & birch instruments.
	Knob	79509	UHF Channel Selector - Model 24-S-531U
	Knob	79467	UHF Channel Selector - For Mahogany, Ebony & Maroon Instruments - Models 24-S-512U, 513U, 529U
	Knob	79508	UHF Channel Selector - Model 24-S-531U
	Knob	79426	UHF Channel Selector - For Oak & Birch Instruments. Models 24-S-514U, 529U, 532U
	Knob	79499	VHF Channel Selector - Model 24-S-531
	Knob	79466	VHF Channel Selector - For Mahogany, Ebony & Maroon Instruments - Models 24-S-512, 513, 529
	Knob	79498	VHF Channel Selector - Model 24-S-531U
	Knob	79425	VHF Channel Selector - For Oak & Birch Instruments - Models 24-S-514, 529, 532
	Safety Glass	78872	Models 24-S-529, U; 531, U; 532, U.
	Safety Glass	79839	Models 24-S-512, U; 513, U; 514, U.
	Mask	78864	Models 24-S-529, U; 531, U; 532, U.
	Mask	79960	Models 24-S-512, U; 513, U; 514, U.

DENVER, COLORADO

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

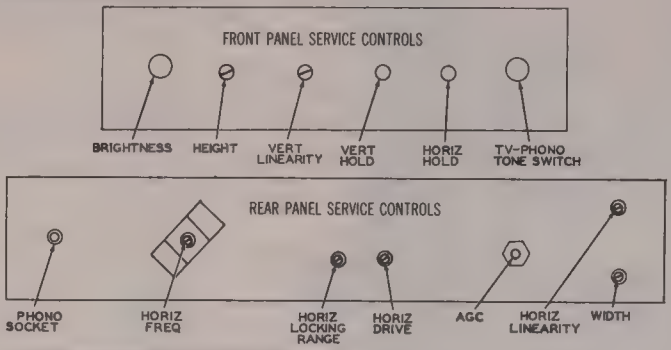
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove rear cover, and remove 10 spring clips located on the inside front of the cabinet (safety glass molding clips). Remove molding and safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS - AGC CONTROL ADJUSTMENT

Tune in the strongest TV signal available. Switch off channel, then back again. If the picture does not appear immediately or bends excessively the AGC control should be readjusted as follows: Turn the AGC control maximum clockwise (raster may bend), then clockwise until a very slight bend or change of bend occurs. Turn the AGC control counter clockwise until the bend or change of bend is just removed.

In weak signal areas the AGC control should be adjusted clockwise until the snow in the picture becomes more pronounced, then counter clockwise for best signal to noise ratio.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L41) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L40) located on bottom of chassis. (See tube placement chart). Removal of chassis is necessary.

FUSES

One fuse is used for horizontal and vertical sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

The anti-pin cushion magnets are mounted on the picture tube bracket above and below the deflection yoke.

Maximum correction is obtained when magnets are positioned closer to the tube.

To adjust, loosen the self-tapping mounting screws and position the magnets until the sides of the raster are straight.

Tighten the screws without altering position of magnets. If necessary, slightly twist or bend the magnet support arms to obtain straight raster edges.

DISASSEMBLY INSTRUCTIONS

1. Remove 6 push-on type control knobs from front panel. (Two located under front door).
2. Remove antenna leads from rear cover.
3. Remove 2 spring clips from rear cover, loosen 2 wood screws holding top of rear cover. Remove rear cover.
4. Disconnect picture tube socket, deflection socket, HV lead and 2 speaker leads from speaker.
5. Remove 6 chassis bolts, remove chassis.
6. Remove 3 speaker nuts, remove speaker.

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SILVERTONE MODELS
4041, B (Ch. 528.304, -1)

SILVERTONE MODELS
4041, B (Ch. 528.304, -1)

TRADE NAME	Silvertone Models 4041 (Ch. 528.304), 4041B (Ch. 528.304-1)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	AC Operated Radio-Phono Combination Superheterodyne Receiver With 3 Speed Automatic Record Changer
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC - 60 Cycles — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2 A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2	"	"	1630KC	"	"	A5	"
3		Loop	1400KC	Tune to 1400KC signal.	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT 488.219-10 SEE SIMILAR UNIT IN PHOTOFACT SET #244-FOLDER #9.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	50	150	T18-321	PRS150/50-30		BBRD5315		TCD497	TVA-2450
B	30	150							
C2	.05	200	T16-197	P288-05	DF-503	CUB2S5		PT415	2TM-S5
C3	47		T15-229	BPD-470	D6-470		GP1K-470	UC-5447	5GA-Q47
C4	.05	200	T16-197	P288-05	DF-503	CUB2S5		PT415	2TM-S5
C5	.05	400	T16-189	P488-05	DF-503	CUB4S5		PT415	4TM-S5
C6A	220								
B	2000								
C	5000		♦T17-108	♦PA-113-1	♦PC-150	♦116TM1	♦1408-01		DT-1
D	250								
E									
C7	.005	600	T16-190	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5
C8	.005	600	T16-190	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5
C9	.05	400	T16-189	P488-05	DF-503	CUB4S5		PT415	4TM-S5
C10	.05	400	T16-189	P488-05	DF-503	CUB4S5		PT415	4TM-S5

♦ Items C6A, C6B, C6C, C6D, C6E, R7A, R7B and R7C are combined in one unit.
When replacing items seperately, C6D and C6E should total 250MMF.
Chassis 528.304-1 omits resistors from C6 couplate unit (part no. T17-104).

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	A24-217	*QJ-607R		F1-40	UF55L	Tone Panel
B	1Meg	½				R2-52	UR16A	Volume Rear
C	Switch					KB-1	US-26	Attach to R1B

* CONCENTRIKIT EQUIVALENT: KIT K-2, BASE ELEMENTS & SHAFTS: B11-133 & P1-102 (PANEL)
B13-137 & R2-124 (REAR)
76-1 SWITCH

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	NOTES
R2	22KΩ	½		BTS-22K	
R3	2.2Meg	½		BTS-2.2Meg	
R4	47Ω	½		BTS-47	
R5	47KΩ	½		BTS-47K	
R6	2.2Meg	½		BTS-2.2Meg	

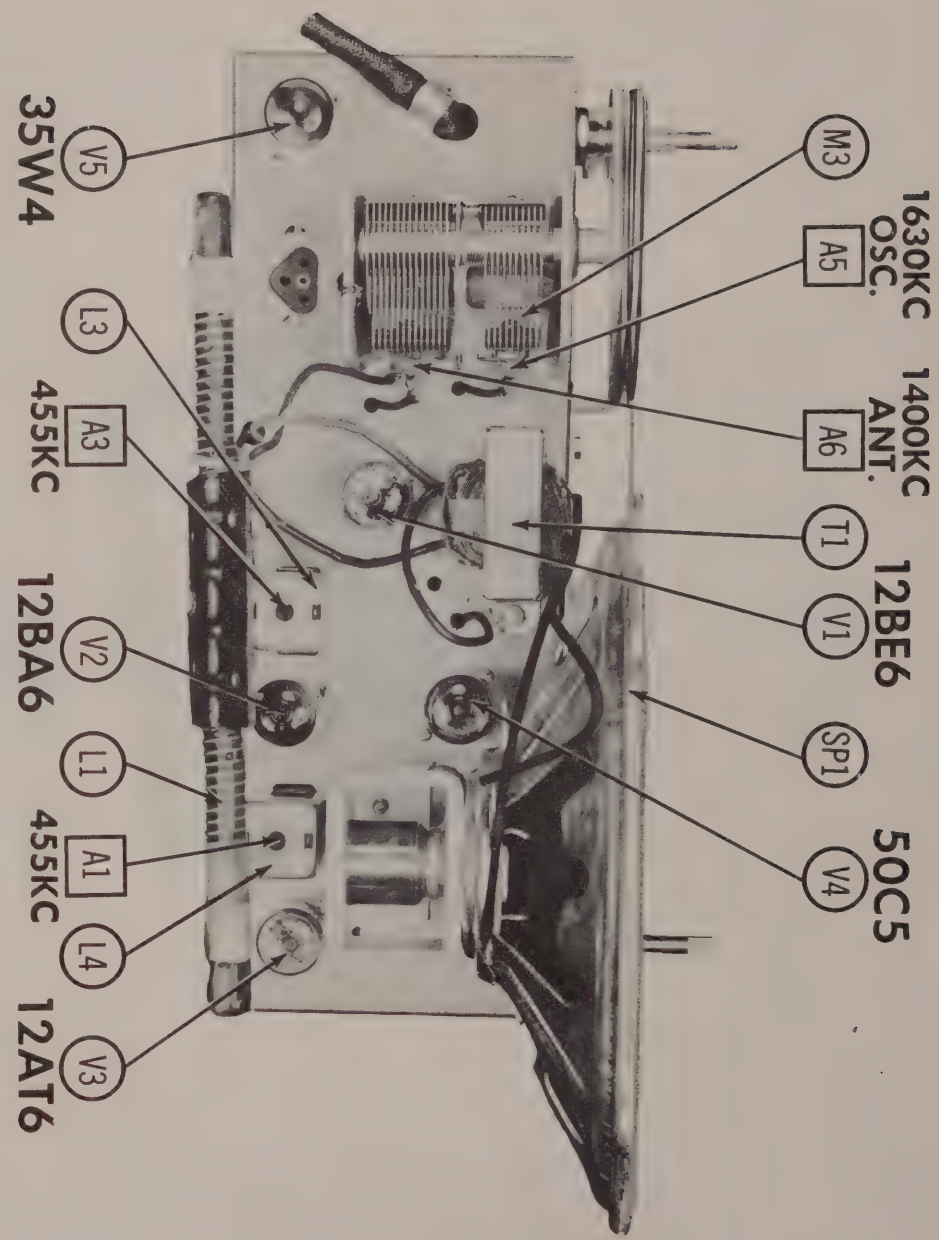
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	NOTES
R7A	6.8Meg	½	♦T17-108	BTS-6.8Meg	Note 1
B	470KΩ	½		BTS-470K	Note 1
C	470KΩ	½		BTS-470K	Note 1
R8	180Ω	½		BTS-180	
R9	1000Ω	1		BTA-1000	
R10	27Ω	½		BTS-27	

♦ Items R7A, R7B, R7C, C6A, C6B, C6C, C6D and C6E are combined in one unit.
Note 1: In chassis 528.304-1, R7A, R7B and R7C are not included in CR unit.
R7A is replaced with a 10Meg resistor, R7B is replaced with a 220KΩ resistor and R7C is replaced with a 470KΩ resistor.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: SILVERTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.5KΩ	3.5Ω	T80-268	A-3336	A-3031①		AZ1102	24S50A	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	SILVERTONE PART No.	VIKING PART No.	QUAM PART No.	
SP1	5" X 7"	PM	3.2Ω	T79-425	57J9	57A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.5Ω		T82-72				
L2	Osc. Coil	.9Ω	7.5Ω	T10-645	14-1074	BC-381*	70-Osc.	
L3	Input IF	19Ω	19Ω	T10-508	16-6758	BC-352	12-C1	
L4	Output IF	20Ω	20Ω	T10-479	16-6758	BC-353	12-C2	

* Drill mounting hole.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							REMARKS
	SILVERTONE PART No.	ASTATIC PART No.		SHURE PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1	K3797	GC-AG-J	G-AG	WC36B	A56U	43	0-2 or S-2	

ASTATIC, SHURE AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

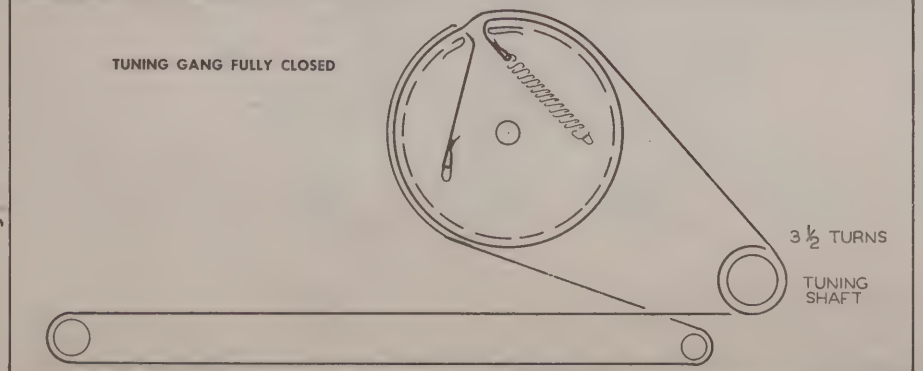
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	SILVERTONE PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2	5732	†S-642 or *S-652 or ♦S-642D	†B-334 or *B-326 or ♦B-334D	†W-3AGS or *W-3AGA or ♦W-3AGD	* Metal † Jewel ♦ Diamond

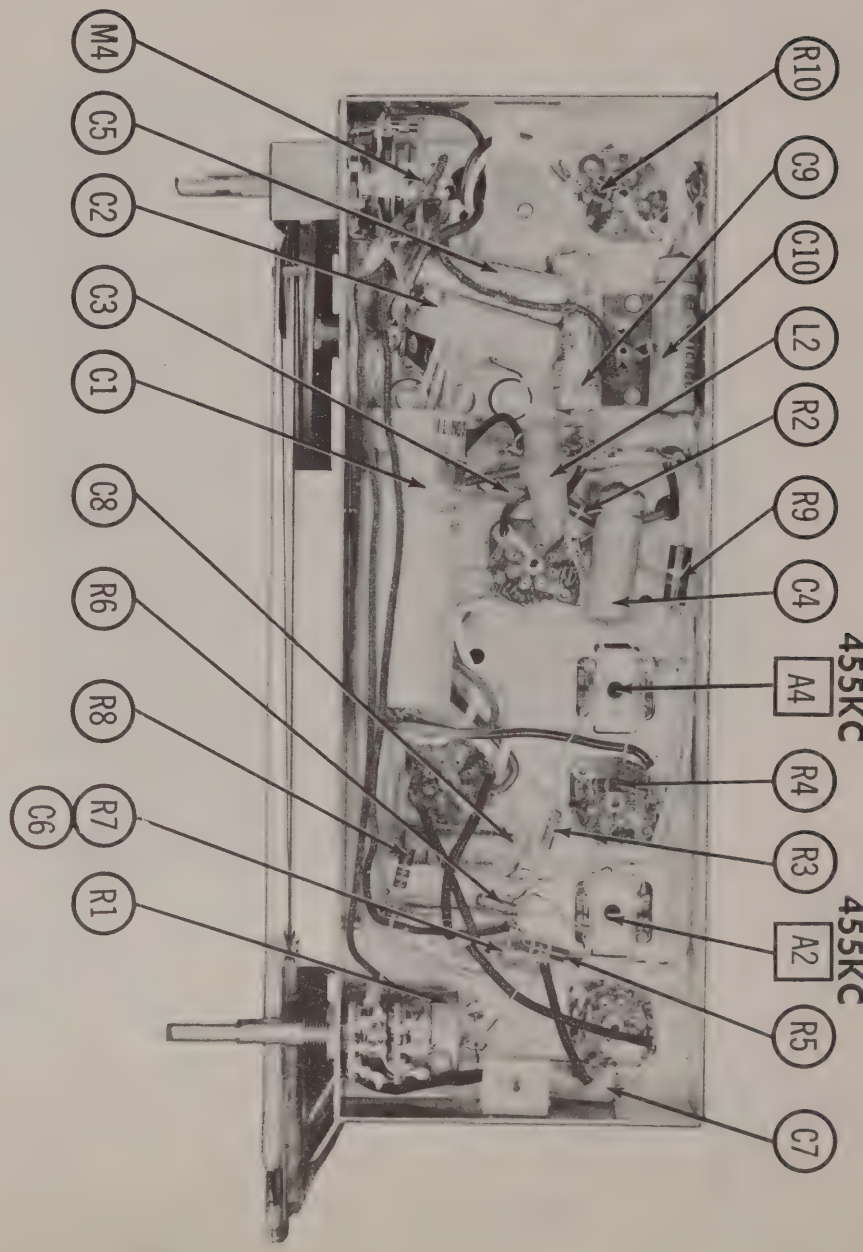
MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M3	Tuning Cap.	T19-236	30-500MMF; 17-188MMF.
M4	Switch	T69-199	Radio-Phono
	Cabinet	T42-662	
	Knob	T52-454	On-Off-Volume & Radio-Phono Switch
	Knob	T52-455	Tuning & Tone
	Dial Glass	T48-82	
	Dial Scale	T40-260	
	Dial Pointer	T58-105	



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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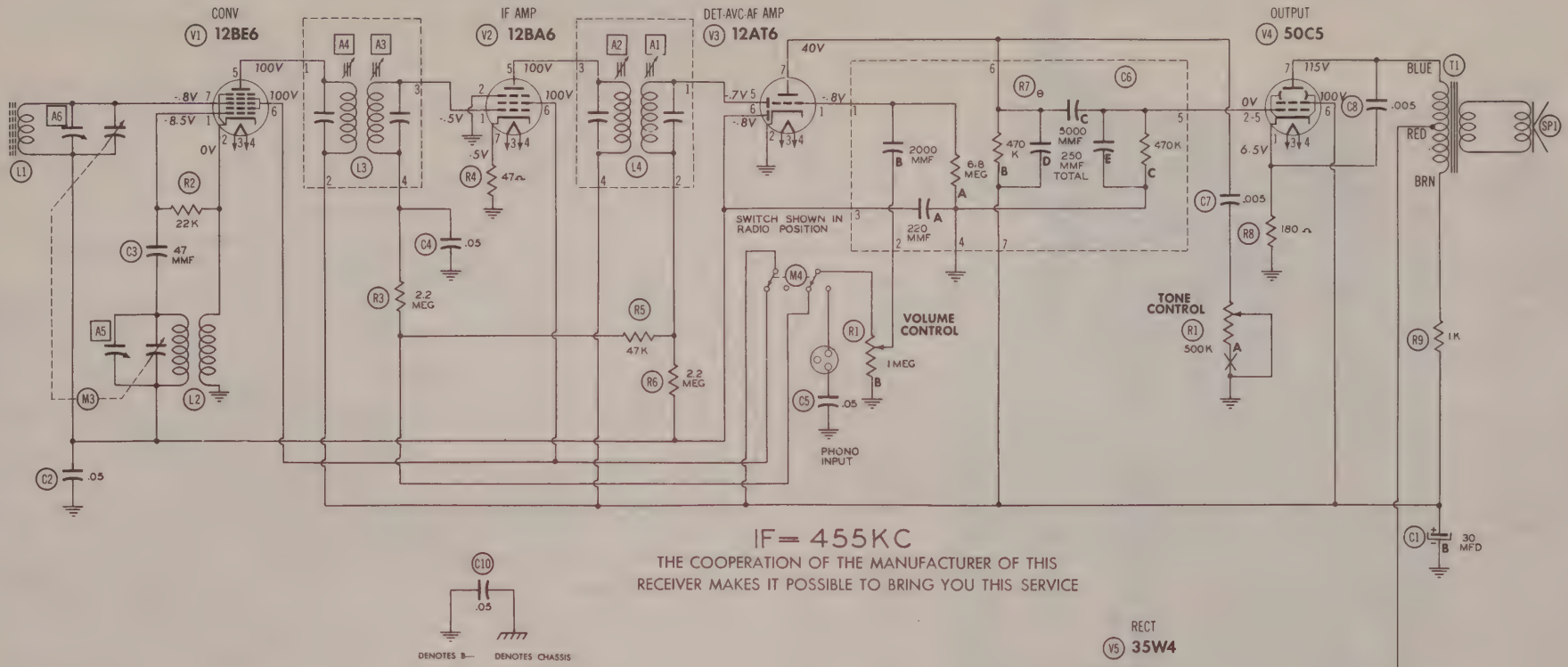
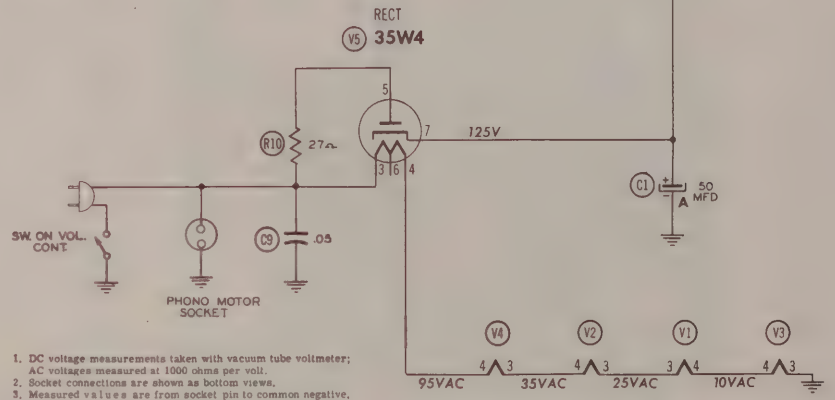


IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.9Ω	25Ω	12Ω	†1KΩ	†1KΩ	3.2Meg
V 2	12BA6	3.2Meg	0Ω	25Ω	37Ω	†1KΩ	†1KΩ	47Ω
V 3	12AT6	6.8Meg	0Ω	0Ω	12Ω	1Meg	3.2Meg	†470KΩ
V 4	50C5	180Ω	470KΩ	37Ω	85Ω	470KΩ	†1KΩ	†220Ω
V 5	35W4	INF	120Ω	120Ω	85Ω	145Ω	90Ω	120KΩ

† MEASURED FROM PIN 7 OF V5.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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RETMA MEMBER

SILVERTONE
MODEL 4225 (Ch. 528.307)

DENVER, COLORADO

SILVERTONE
MODEL 4225 (Ch. 528.307)

SILVERTONE
MODEL 4225 (Ch. 528.307)

TRADE NAME	Silvertone Model 4225 (Ch. 528.307)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan, Chicago, Illinois
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Five)	Types 1U4 RF Amp., 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY	110-120 Volts AC-DC (or) 9 Volts "A" Supply & 90 Volts "B" Supply In Pack Form
RATINGS	.13 Amp. @ 117 Volts AC (or) 60MA @ 9 Volts DC & 7.5MA @ 90 Volts DC
TUNING RANGE—BROADCAST	535-1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1R5 (V2). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	"	"	1610KC	"	"	A5	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A6, A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

SILVERTONE
MODEL 4225 (Ch. 528.307)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		SILVERTONE PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	1U4	1U4	6AR	
V2	Converter	1R5	1R5	7AT	
V3	IF Amplifier	1U4	1U4	6AR	
V4	Det.-AVC-AF Amp.	1U5	1U5	6BW	
V5	Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	70	150	T18-320			BBRT5315		TCT-3094	
B	30	150				C25			
C	200	15							
C2	.05	200	T16-152	P288-05	DF-503	CUB2S5		PT415	2TM-S5
C3	2.2		T15-255	SI2.2NP0	TCZ-2.2	TZ05	NP0A-2R2		5TCCB-V22
C4	10		T15-223	SI10NP0	TCZ-10	Z018	NP0K-100	ZT-541	5TCC-Q1
C5	10000		T15-211	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1
C6	5000		T16-177	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5
C7	.1	200	T16-210	P288-1	DF-104	CUB2P1		PT401	2TM-P1
C8	.05	200	T16-152	P288-05	DF-503	CUB2S5		PT415	2TM-S5
C9A	150		♦T17-105	♦PA-136	♦PC-160	G046	811-151	UC-5315	♦DP-1
B	2000					K072	801-002	DC-522	
C	10000					K082	811001	DC-511	
D	150					G046	811-151	UC-5315	
E	5000					K080	811-005	DC-525	
C10	2000		T15-228	BPD-002	DD-202	K072	801-002	DC-522	5HK-D2
C11	.05	400	T16-179	P488-05	DF-503	CUB4S5		PT415	4TM-S5
C12	.05	400	T16-179	P488-05	DF-503	CUB4S5		PT415	4TM-S5

♦ Items C9A, C9B, C9C, C9D, C9E, R12A, R12B, R12C and R12D are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1	1Meg	½	T24-219					Volume & Switch

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R2	4.7Meg	½	T60-779	BTS-4.7Meg	
R3	22KΩ	½	R60-744	BTS-22K	
R4	1500Ω	½	T60-729	BTS-1500	
R5	100KΩ	½	T60-727	BTS-100K	
R6	12KΩ	½	T60-811	BTS-12K	
R7	8.2Meg	½	T60-728	BTS-8.2Meg	Note 1
R8	1500Ω	½	T60-729	BTS-1500	
R9	47KΩ	½	T60-730	BTS-47K	
R10	2.2Meg	½	T60-726	BTS-2.2Meg	
R11	470Ω	½	T60-770	BTS-470	

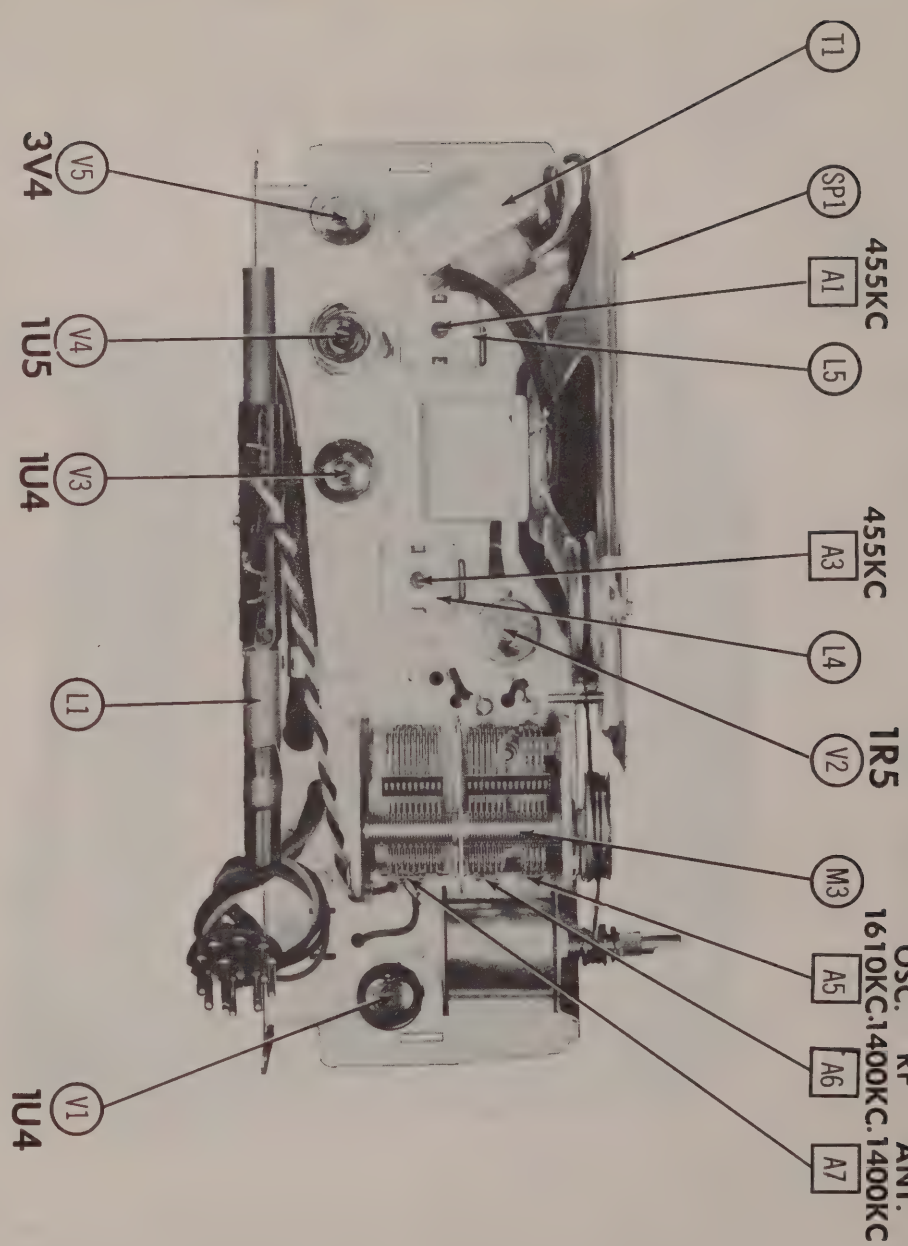
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R12A	10Meg	½	♦T17-105	BTS-10Meg	
B	4.7Meg	½		BTS-4.7Meg	
C	1Meg	½		BTS-1Meg	
D	3.3Meg	½		BTS-3.3Meg	
R13	330Ω	½	T60-704	BTS-330	
R14	680Ω	½	T60-708	BTS-680	
R15	2000Ω 5%	10	T60-879		
R16	1500Ω	½	T60-729	BTS-1500	
R17	110Ω	3	T60-796		

Note 1: Some versions use a 10Meg in this application.
♦ Items R12A, R12B, R12C, R12D, C9A, C9B, C9C, C9D and C9E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SILVERTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	8.8KΩ	3.3Ω	T80-313	A-3329	A-2927 ①	S-8X	Z1116 ①	24S49	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	SILVERTONE PART No.	VIKING PART No.	QUAM PART No.	
SP1	4 x 6"	PM	3.3Ω	T79-426	46J6	46A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.6Ω		T82-92				
L2	RF Coil	7.5Ω	12Ω *	T10-655				
L3	Osc. Coil	1.7Ω	9.5Ω	T10-664				
L4	Input IF	20Ω	20Ω	T10-508	16-6758	BC-352	12-C1	
L5	Output IF	20Ω	20Ω	T10-508	16-6758	BC-353	12-C2	

* Tapped @ 9Ω .

SELENIUM RECTIFIER

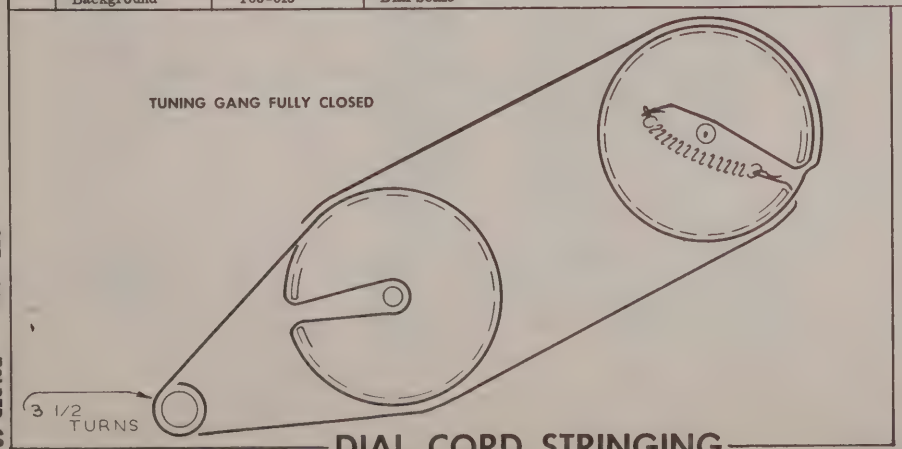
ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	SILVERTONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	
M1	.065A	T83-568	1003	RS75	6S65	75	5M4	

BATTERIES

ITEM No.	VOLTAGE	SILVERTONE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	9V "A" 90V "B"	6407			753			F6A60	

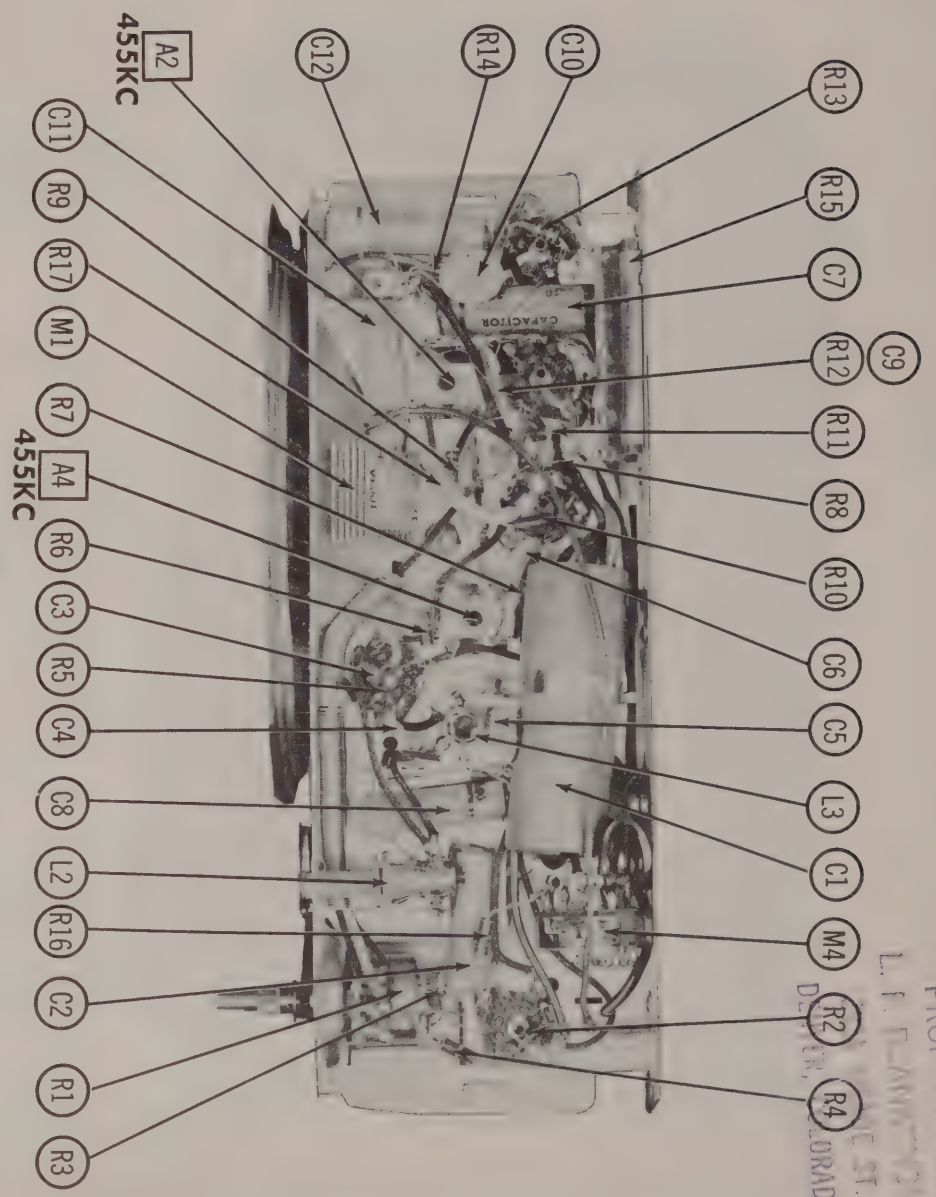
MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M3	Tuning Cap.	T19-238	18-313MMF, 10-210MMF, 10-80MMF
M4	Switch	T69-186	Change-over
	Cabinet	T42-666	
	Knob	T52-460	Tuning
	Knob	T52-461	On-off-volume
	Crystal	T48-84	Dial Scale
	Background	T83-818	Dial Scale



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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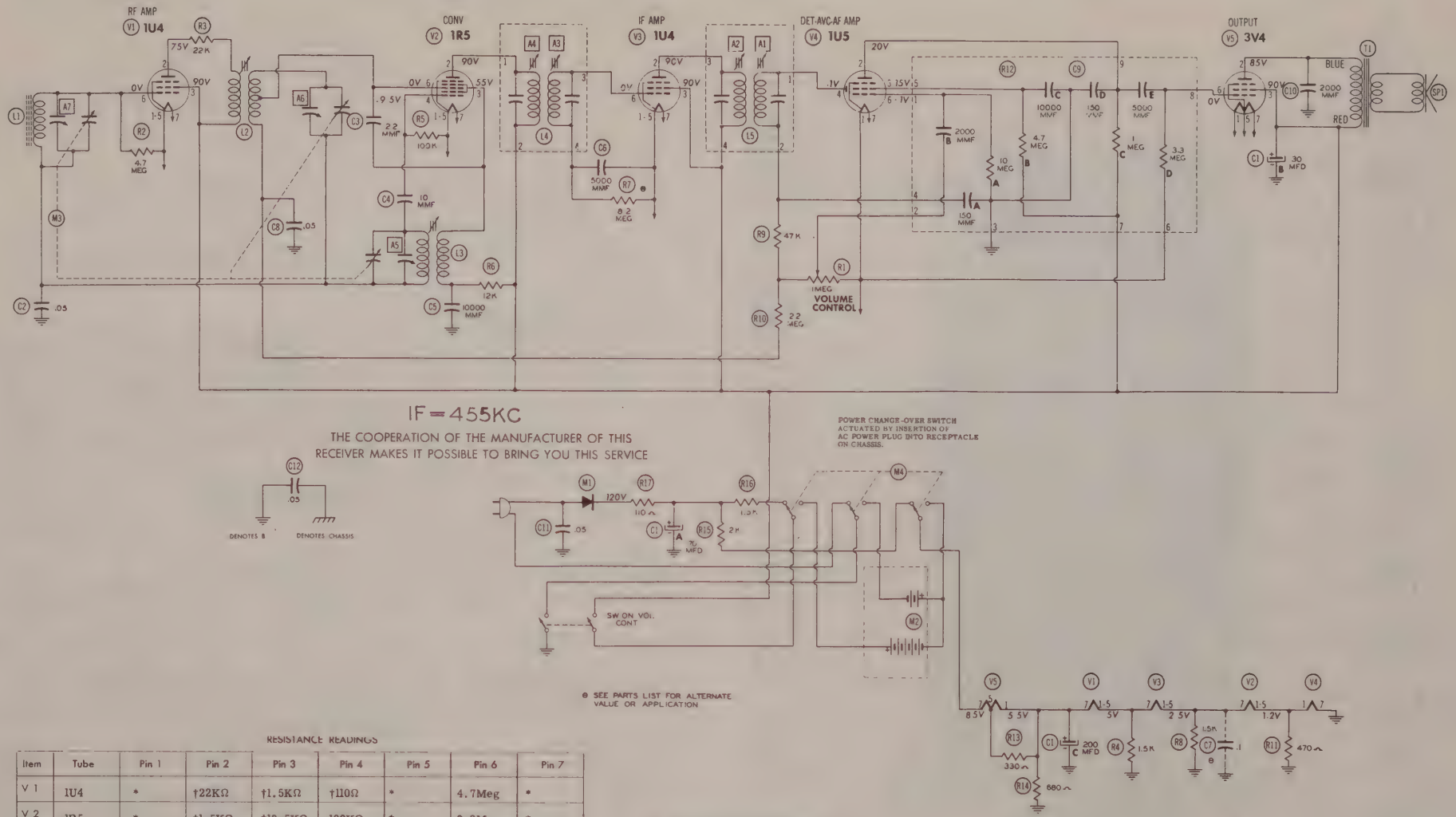
DENVER, COLORADO

SILVERTONE
MODEL 4225 (Ch. 528.307)



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1U4	*	†22KΩ	†1.5KΩ	†110Ω	*	4.7Meg	*
V 2	1R5	*	†1.5KΩ	†13.5KΩ	100KΩ	*	3.2Meg	*
V 3	1U4	*	†1.6KΩ	†1.6KΩ	2.2Meg	*	10Meg	*
V 4	1U5	*	†1Meg	†4.7Meg	1Meg	*	10Meg	*
V 5	3V4	*	†2.5KΩ	†1.5KΩ	INF	*	3.3Meg	*

† MEASURED FROM OUTPUT OF M1
* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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STROMBERG-CARLSON MODEL T-4

PROPERTY OF
L. F. E[illegible]
3924 MEADE ST.
DENVER, COLORADO

STROMBERG-CARLSON
MODEL T-4

STROMBERG-CARLSON
MODEL T-4

TRADE NAME	Stromberg-Carlson Model T-4
MANUFACTURER	Stromberg-Carlson Co., Service Dept., 302 N. Goodman St., Rochester, N.Y.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC — RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~Mod	Point of non-interference	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1625KC	Tuning gang fully open	"	A5	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

STROMBERG-CARLSON
MODEL T-4

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Stromberg-Carlson PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	6BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Stromberg-Carlson PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	50	150	111124	PRS150/50-50		BBRD5515		TCD49	TVA-2453
B	50	150							
C2	.05	400	110801	P488-05	DF-503	CUB4S5		PT415	4TM-S5
C3	100		110694	81100	D6-101	TP34	GP1K-101	UC-531	5GA-T1
C4	.005	600	110688	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5
C5A	250	①	128202	PA-112-1 ①	PC-70 ①	112TM1 ①	1406-01 ①		T-3 ①
B									
C	5000								
C6	10000		110672	BPD-01	DD-103	K080	811-01	DC-511	5HK-S1
C7	.05	400	110801	P488-05	DF-503	CUB4S5		PT415	4TM-S5
C8	.1	400	110802	P488-1	DF-104	CUB4P1		PT401	4TM-P1

① Items C5A, C5B, C5C, R7A and R7B are combined in one unit. When replacing items separately items C5A and C5B should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Stromberg-Carlson PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	145185	Q13-133	A47-500K-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Stromberg-Carlson PART No.	IRC PART No.	NOTES
R2	22KΩ	½	149109	BTS-22K	
R3	150Ω	½	28148	BTS-150	
R4	47KΩ	½	149111	BTS-47K	
R5	2.2Meg	½	149121	BTS-2.2Meg	
R6	10Meg	½	149125	BTS-10Meg	

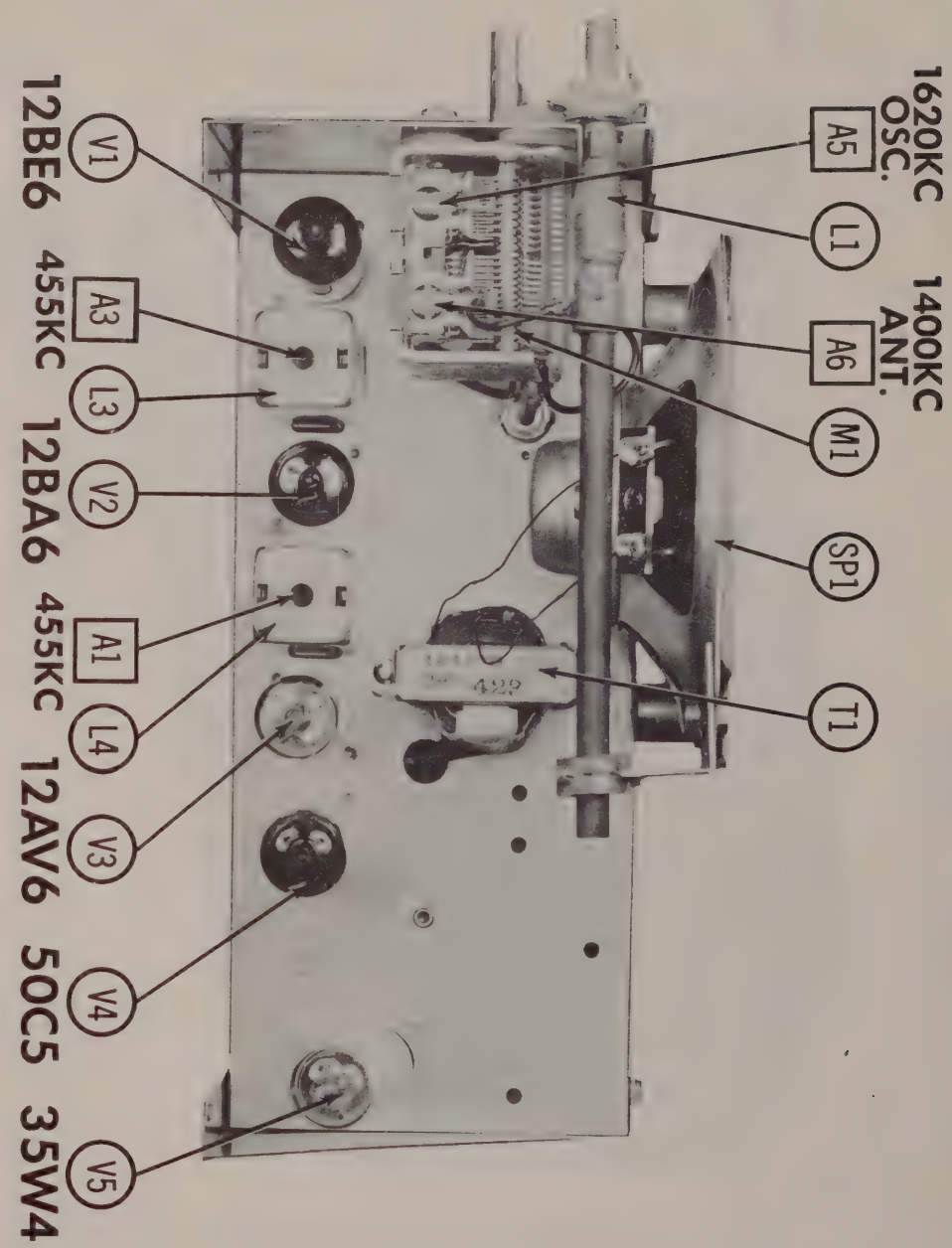
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: Stromberg-Carlson PART No.	IRC PART No.	NOTES
R7A	500KΩ	½	♦128202	BTS-500K	
B	500KΩ	½		BTS-500K	
R8	150Ω	½	28148	BTS-150	
R9	1200Ω	1	149177	BTA-1200	

♦ Items R7A, R7B, C5A, C5B, C5C are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: Stromberg-Carlson PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.3KΩ	3.4Ω	161279	A-3332	A-3025	S-12X	Z1101	26S58	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Stromberg-Carlson PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.4Ω	155844	ST-113 Mod. P4-X	4A07	

COILS (RF-IF)

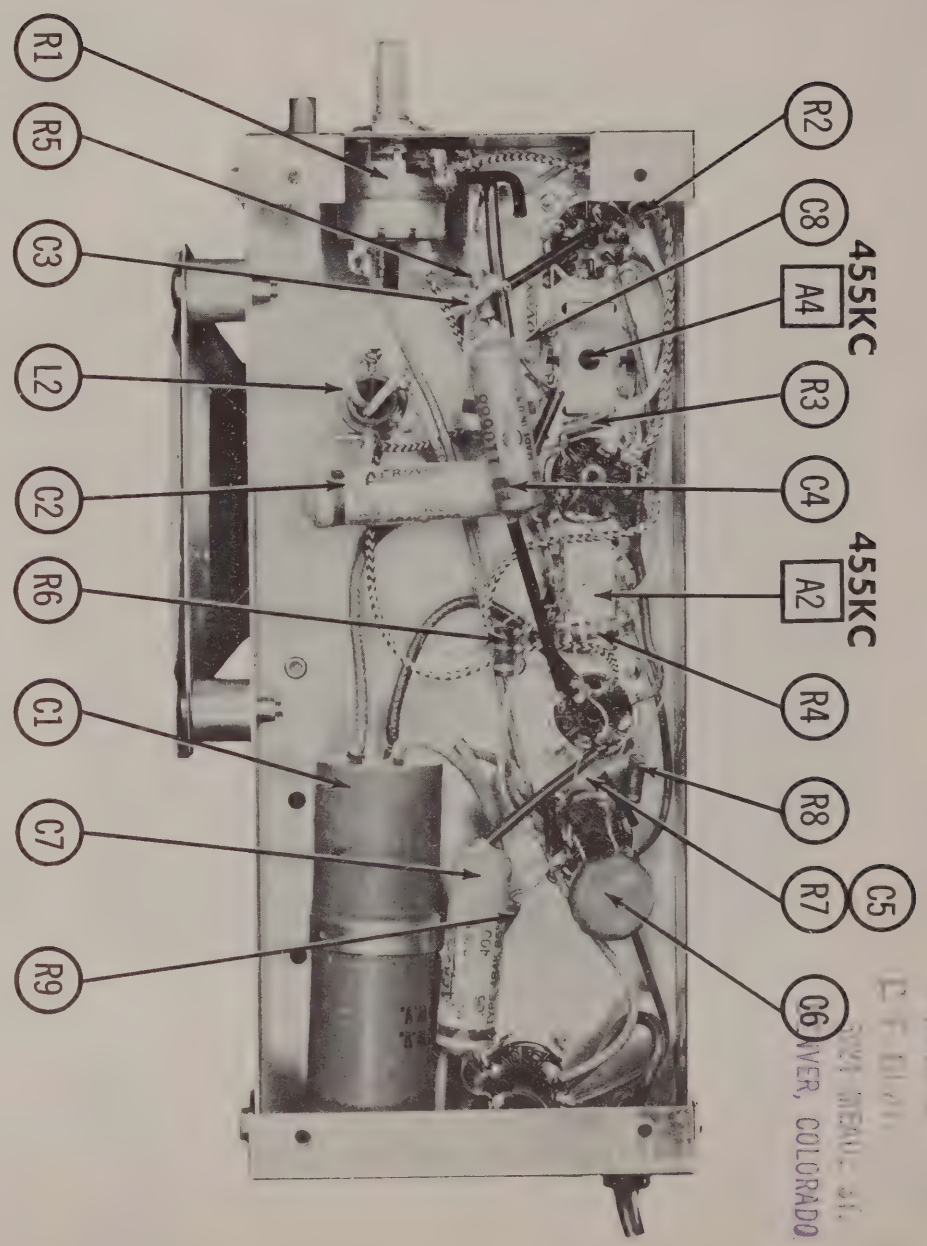
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Stromberg-Carlson PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.6Ω		139061				
L2	Osc. Coil	.6Ω	6.5Ω	114144	14-1060 *		71-Osc.*	
L3	Input IF	15Ω	15Ω	114364	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	15Ω	114453	16-6754	BC-355	12-C6	

* Drill new mounting hole.

MISCELLANEOUS

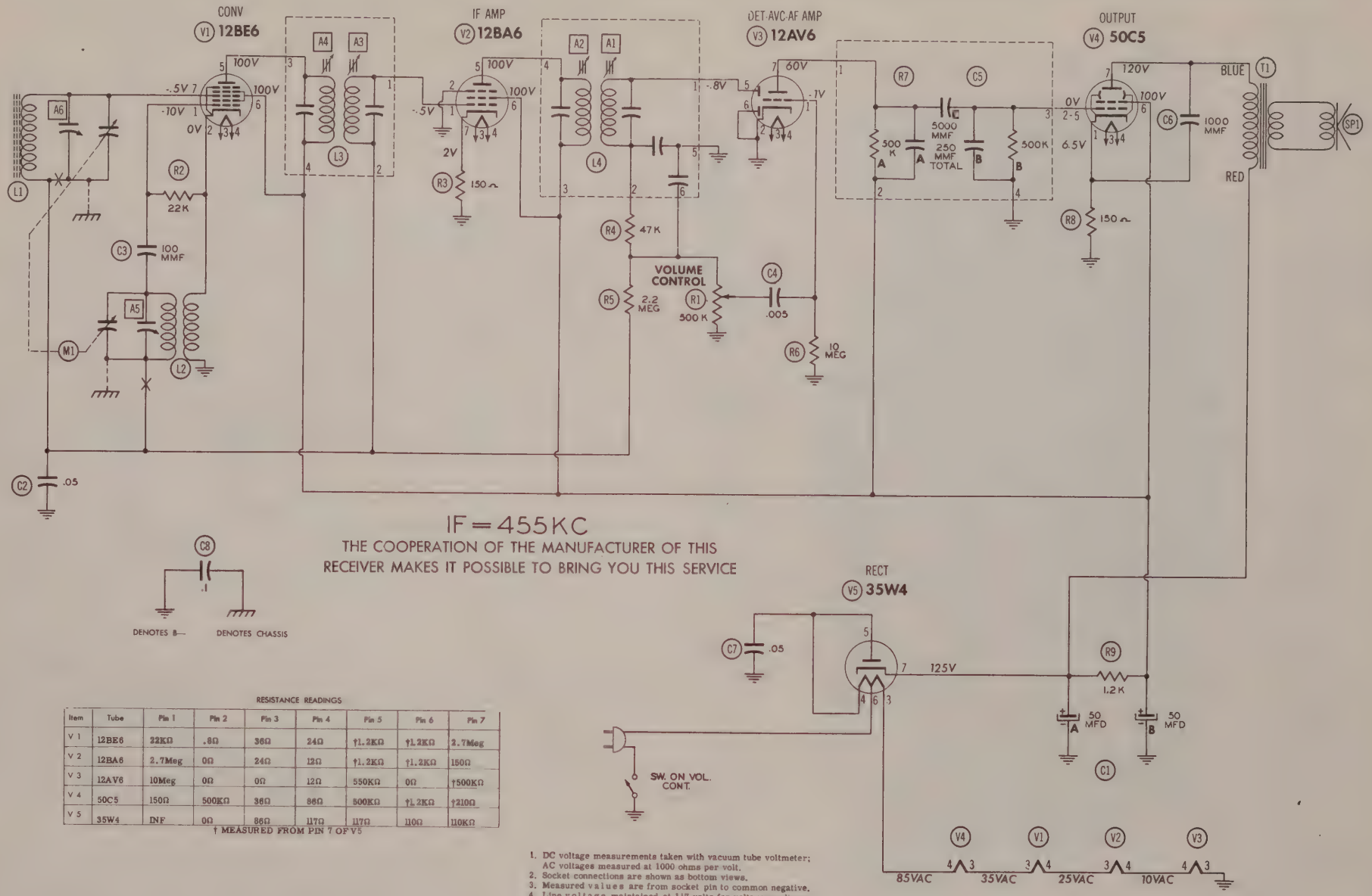
ITEM No.	PART NAME	Stromberg-Carlson PART No.	NOTES
M1	Tuning Cap.	110058	26-370MMF, 15-120MMF
	Cabinet	108385	Citron
	Cabinet	108386	Black
	Cabinet	108387	Antique white
	Cabinet	108388	Coral
	Cabinet	108389	Green
	Cabinet	108390	Sandalwood
	Knob	134246	On-off-volume
	Knob	134247	Tuning

CHASSIS—BOTTOM VIEW



DENVER, COLORADO

STROMBERG-CARLSON MODEL T-4



IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

C8 .1

DENOTES B— DENOTES CHASSIS

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	36Ω	24Ω	†1.2KΩ	†1.2KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	24Ω	12Ω	†1.2KΩ	†1.2KΩ	150Ω
V 3	12AV6	10Meg	0Ω	0Ω	12Ω	550KΩ	0Ω	†500KΩ
V 4	50C5	150Ω	500KΩ	36Ω	86Ω	500KΩ	†1.2KΩ	†210Ω
V 5	35W4	INF	0Ω	86Ω	117Ω	117Ω	110Ω	110KΩ

† MEASURED FROM PIN 7 OF V5

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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WEBSTER-ELECTRIC
MODELS WCM1-1, WCS1-1

PRO
L. F. BLA .P
3924 ME ST.
DENVER, COLORADO

WEBSTER-ELECTRIC
MODELS WCM1-1, WCS1-1

WEBSTER-ELECTRIC
MODELS WCM1-1, WCS1-1

TRADE NAME	Webster-Electric Models WCM1-1 (Master), WCS-1 (Speaker Unit)
MANUFACTURER	Webster Electric Co., Racine, Wisconsin
TYPE SET	AC-DC Operated Intercommunication Master Unit & Remote Speaker Unit
TUBES (Three)	Types 12BA6 AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC RATING .22 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

WEBSTER-ELECTRIC
MODEL WCM-1

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Webster-Electric PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier	12BA6	12BA6	7BK	
V2	Output	50C5	50C5	7CV	
V3	Rectifier	35W4	35W4	6BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	Webster-Electric PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.
C1A	■50	150	P10695-1	AFH3-77		C056		FP310	TVL-2432
B	▲30	150							TVA-1204
C	10	25							
C2	.006	200	211-14517	P488-006	D6-602	CUB6D6	GP2-333-602	PT626	6TM-D6
C3	.02	400	211-15046	P488-02	DF-203	CUB4S2	817-02	PT412	4TM-S2
C4	.005	600	S4512	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5
C5	.1	400	211-13083	P488-1	DF-104	CUB4P1		PT401	4TM-P1

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Webster-Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	S6926	Q13-133	A47-500K-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

RESISTORS

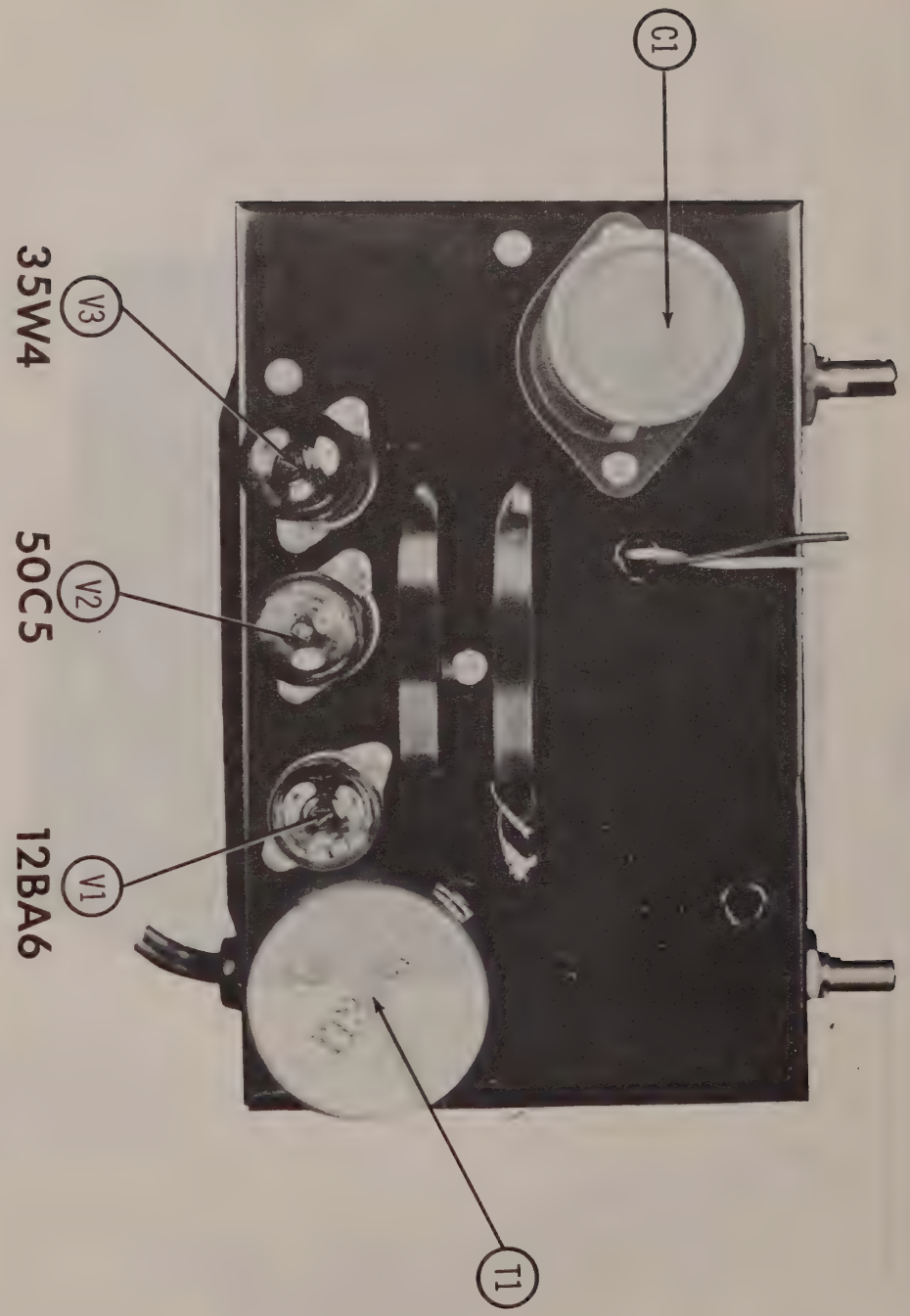
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Webster-Electric PART No.	IRC PART No.	
R2	10Meg	½		BTS-10Meg	
R3	1.5Meg	½		BTS-1.5Meg	
R4	510KΩ 5%	½		BTS-510K 5%	
R5	160Ω 5%	½		BTS-160Ω 5%	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Webster-Electric PART No.	IRC PART No.	
R6	5100Ω 5%	½		BTS-5100 5%	
R7	51Ω 5%	½		BTS-51	
R8	82Ω	½		BTS-82	
R9	200Ω	5			

TRANSFORMER (INPUT)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Webster-Electric PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	1.46Ω Res.	1.2KΩ Res.			IT-3533					
	Turns	Ratio 1 - 65								

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Webster-Electric PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	2.4KΩ	47Ω	3534-1	A-3332	A-3025	S-12X	Z1101	26S58	

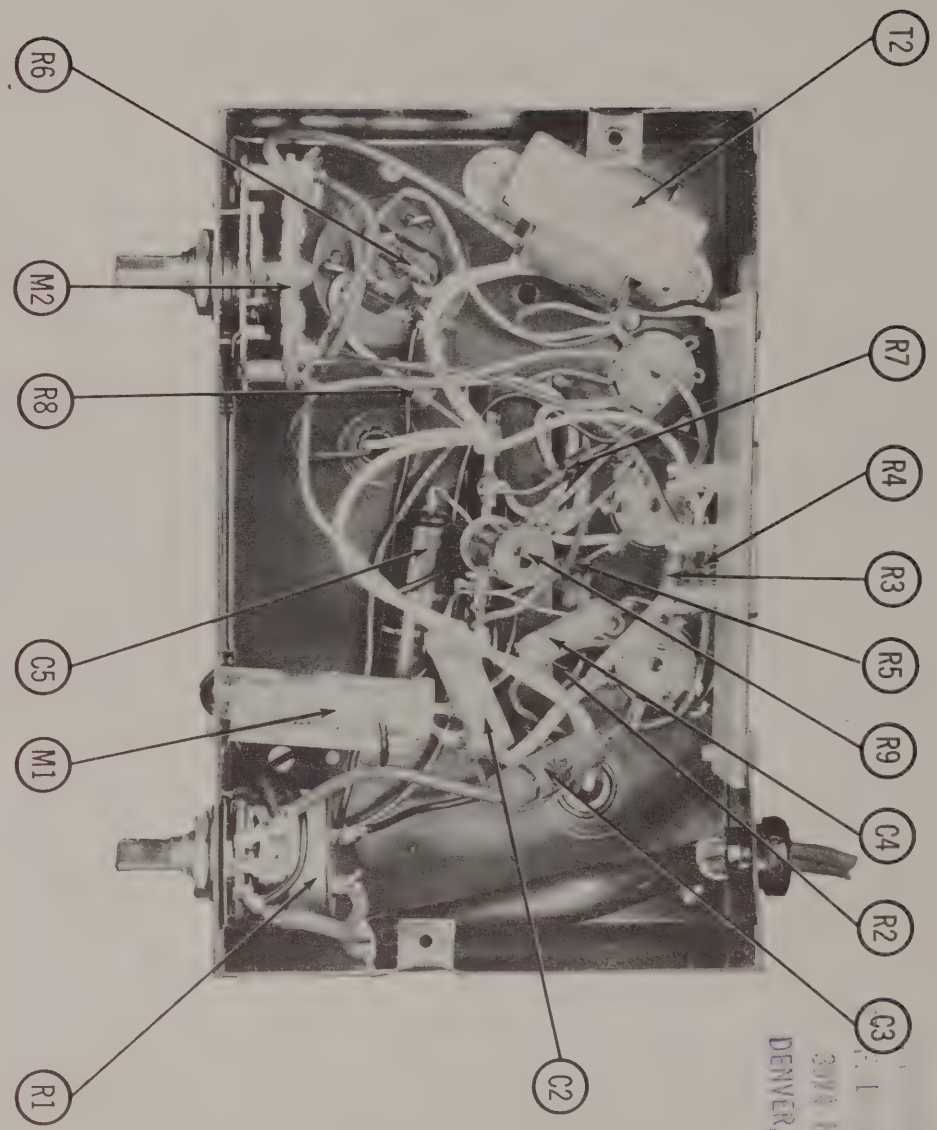
SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Webster-Electric PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	47Ω	S6932 S4682-1 ①	ST-739 Mod. P4-X	4A07Z45	① Alternate speaker

MISCELLANEOUS

ITEM No.	PART NAME	Webster-Electric PART No.	NOTES
M1	Dial Light	P8914-1	#47, Bayonet
M2	Switch	211-18987	Talk-Listen
	Cabinet	211-13639-5	
	Knob	211-30102	On-off-volume
	Knob	211-30104	Talk-Listen
	Jewel	P10678	
	Name Plate	211-18956	

CHASSIS—BOTTOM VIEW



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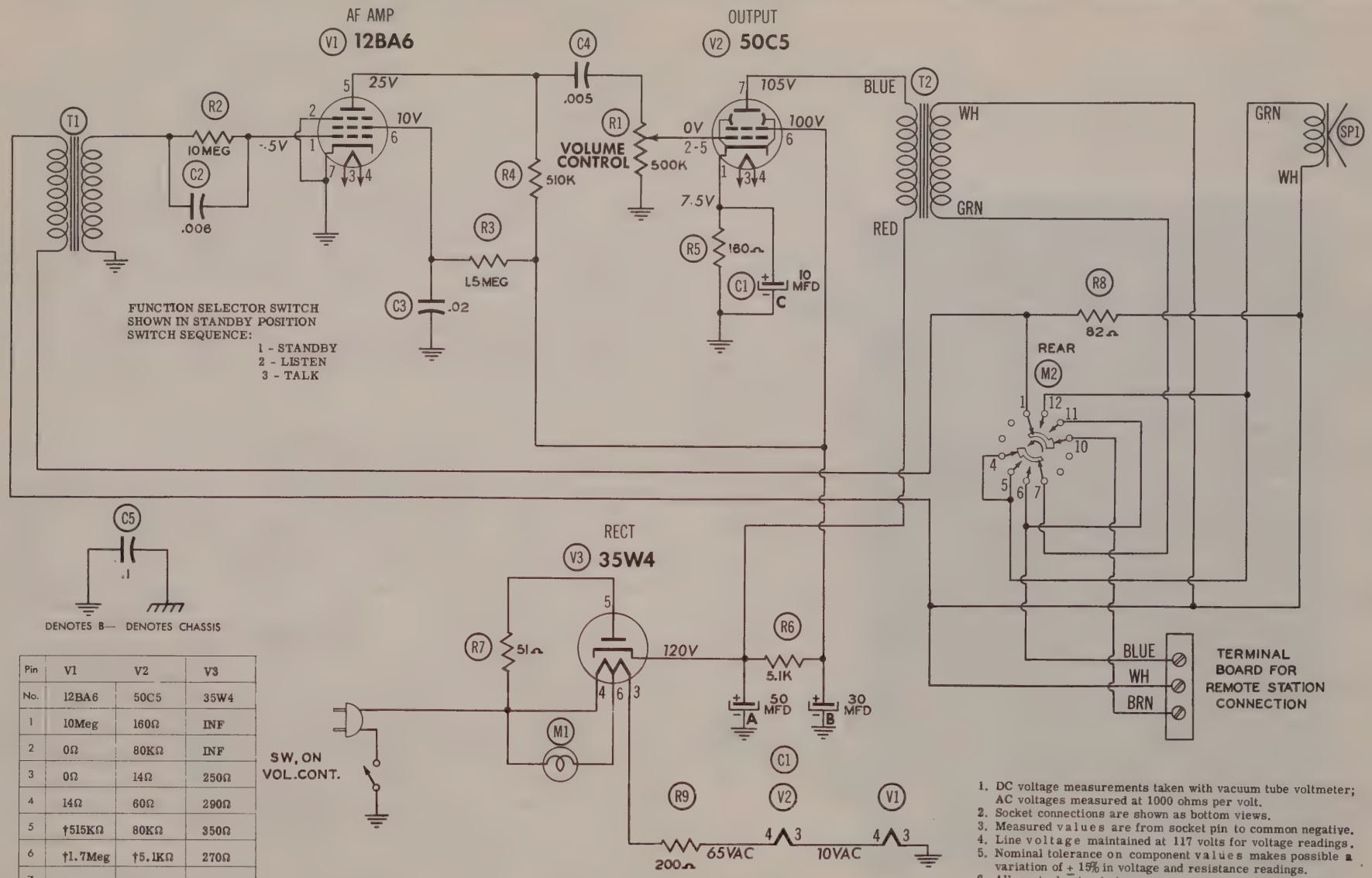
WEBSTER-ELECTRIC
MODEL WCM1-1

WEBSTER-ELECTRIC
MODEL WCM1-1



Pin No.	V1 12BA6	V2 50C5	V3 35W4
1	10Meg	160Ω	INF
2	0Ω	80KΩ	INF
3	0Ω	14Ω	250Ω
4	14Ω	60Ω	290Ω
5	†515KΩ	80KΩ	350Ω
6	†1.7Meg	†5.1KΩ	270Ω
7	0Ω	†320Ω	30KΩ

† MEASURED FROM PIN 7 OF V3

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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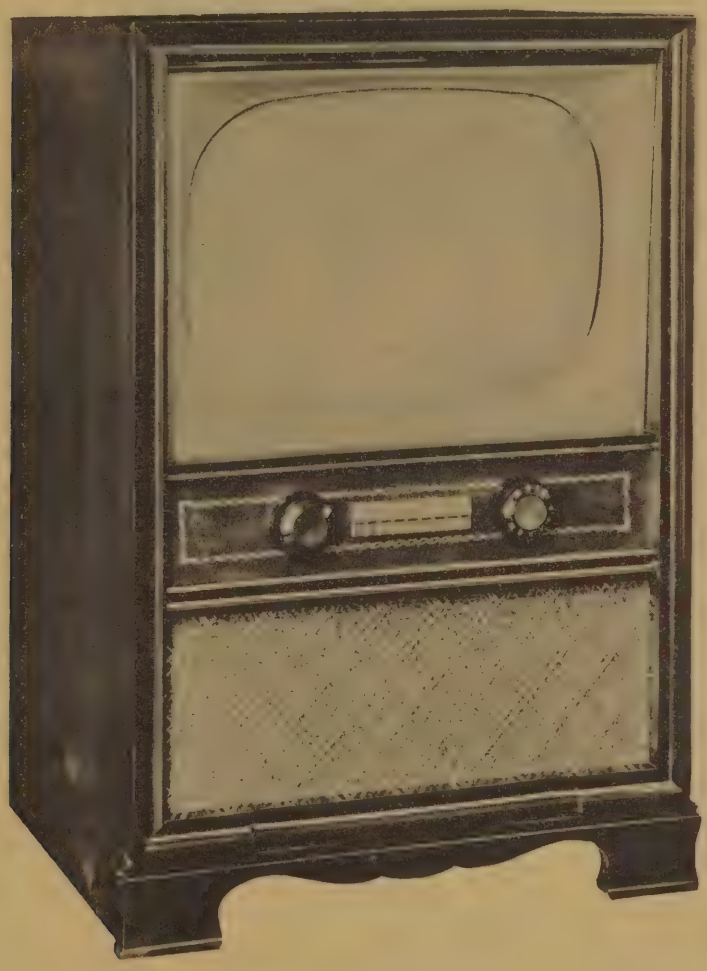

MODEL 321GM47-486

WELLS-GARDNER MODELS
321GM47-486, 2321GM47-488

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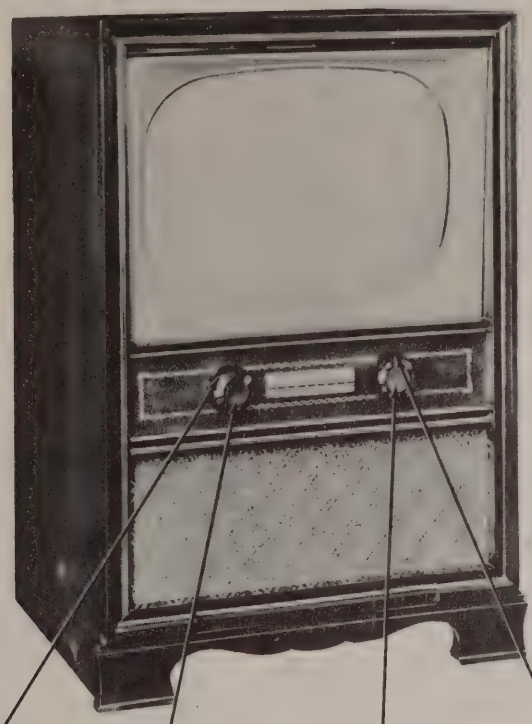

Wells-Gardner Model 321GM47-486

TRADE NAME	Wells-Gardner Models 321GM47-486, 2321GM47-488
MANUFACTURER	Wells-Gardner Co., 2701 N. Kildare Ave., Chicago 39, Ill.
TYPE SET	Television Receiver
TUBES	Twenty-three
POWER SUPPLY	110-120 Volts AC - 60 Cycle — RATING 1.7 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13, Video 26.2MC, Sound IF 21.7MC (Intercarrier)

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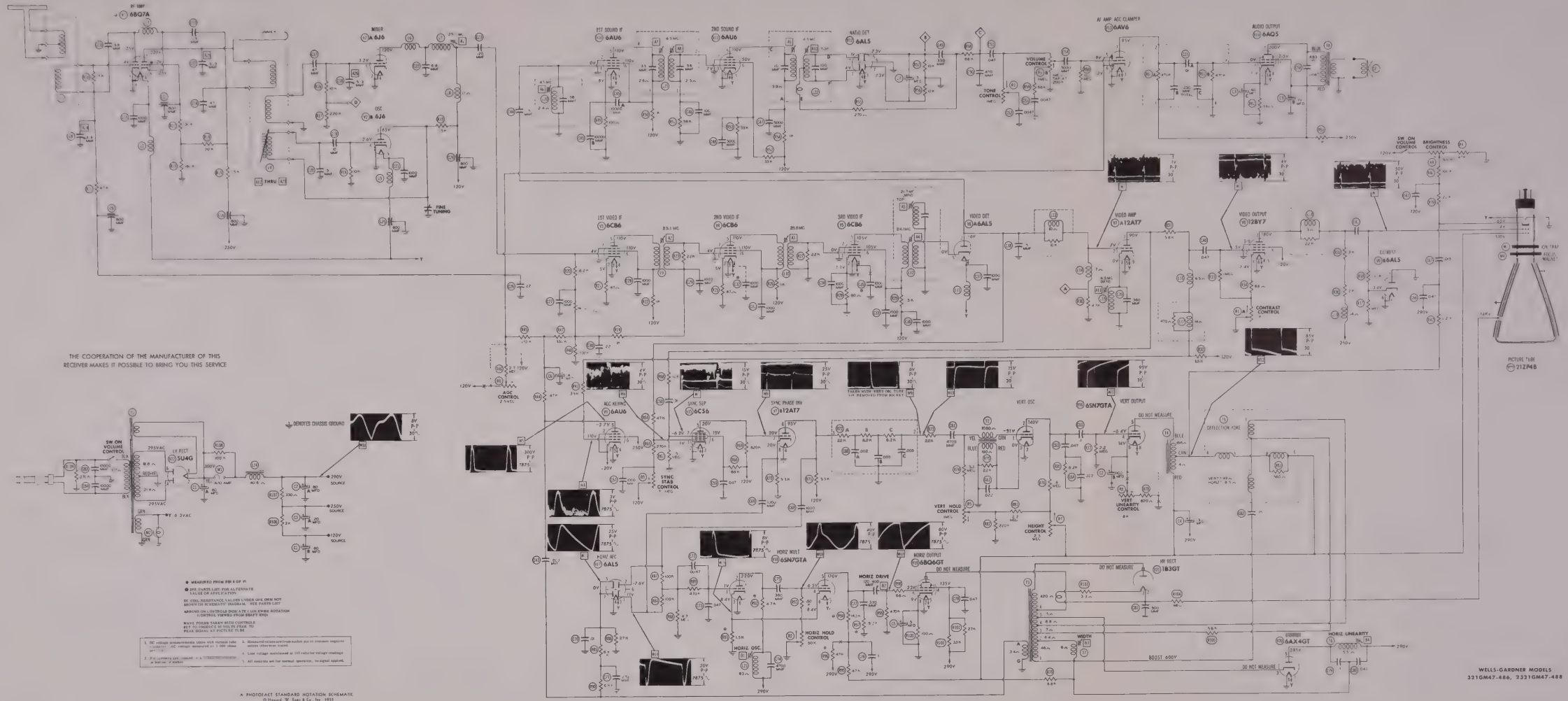
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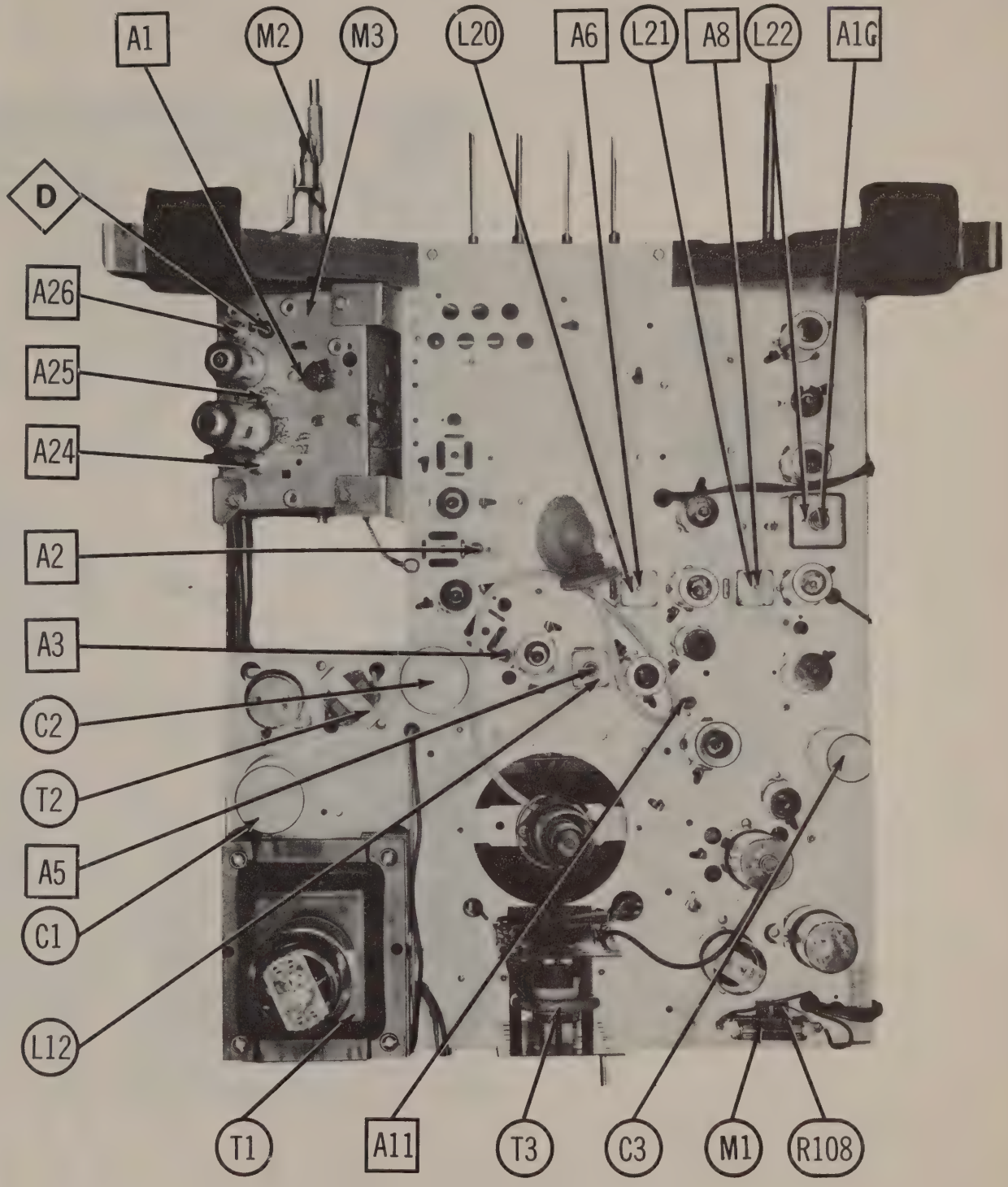

CHASSIS TOP VIEW

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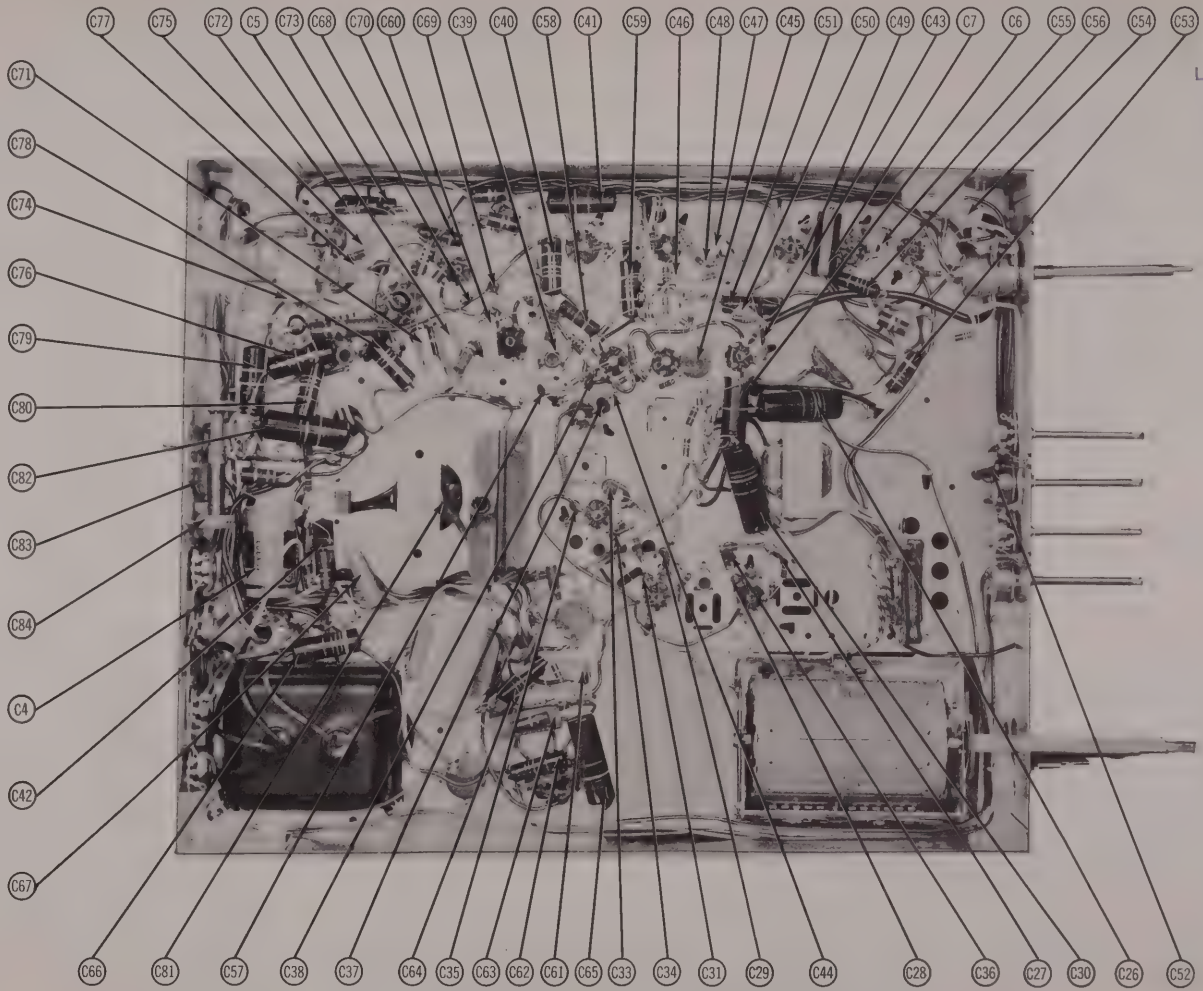

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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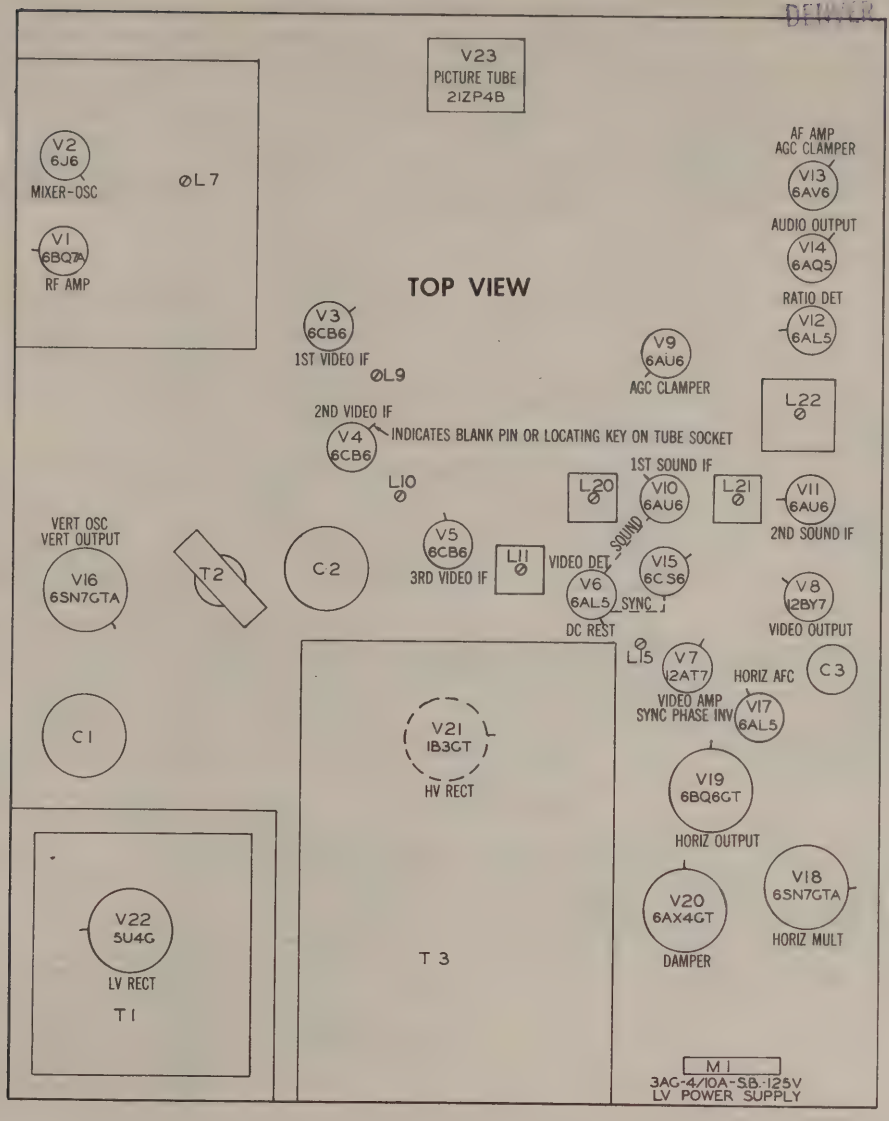

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V22, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V8, V9, V23
Has pic, no sound - V10, V11, V12, V13, V14
Overloaded picture - V9, V13

SYNC FAILURE
No vert. sync - V7, V16
No horiz. sync - V7, V17, V18
No vert. or horiz. sync - V7, V15

SWEEP FAILURE
No raster, has sound - V18, V19, V20, V21, V23
No vertical deflection - V16
Poor vert. linearity or foldover - V16
Poor horiz. linearity or foldover - V18, V19, V20
Narrow picture - V18, V19, V20, V21, V22
Vert. off freq. - V7, V16
Horiz. off freq. - V7, V17, V18

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multivibrator tube (V18) to disable the high voltage.

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias battery to the ungrounded side of C30. Connect the positive lead to chassis.
Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed.
This will disable the local oscillator and reduce the possibility of erroneous indications.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	25.25MC (Unmod)	Any	DC probe thru filter (Fig.1) to point (A). Common to chassis.	A1	Attenuate generator output to maintain not more than 2 volts at VTVM. Adjust for maximum deflection.
2.	"	"	23.1MC	"	"	A2	"
3.	"	"	25.9MC	"	"	A3	"
4.	"	"	24.1MC	"	"	A4	"
5.	"	"	21.7MC	"	"	A5	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Leave bias battery connected as under "Video IF Alignment".
Use only enough sweep generator output to provide usable indication on scope.
Connect a .005MFD capacitor across the vertical input terminals of scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.7MC 23.0MC 23.5MC 25.25MC 26.2MC	Any	Vert. Amp. thru 22KΩ to point (A). Low side to chassis.		Check for response curve similar to Fig. 2. If necessary, SLIGHTLY retouch A1 thru A4 to obtain desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

If a signal generator providing 4.5MC signal of crystal accuracy is not available restore the set to normal operating condition and tune in a local TV station. Connect the VTVM and adjust A6 thru A10 as in steps 7 and 8.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (B). Common to chassis.	A6, A7, A8, A9	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point (C). Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (B). Low side to chassis.	A6, A7, A8, A9	Disconnect stabilizing capacitor C7. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
8.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A10	Reconnect stabilizing capacitor C7. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.01MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig.5) to pin 2 (grid) of picture tube.	A11	Adjust for MINIMUM deflection.

ALTERNATE 4.5MC TRAP ALIGNMENT

Tune in a TV station and adjust A11 for minimum 4.5MC. beat interference in picture.

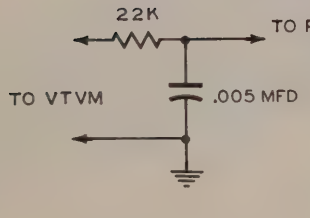

FIG. 1

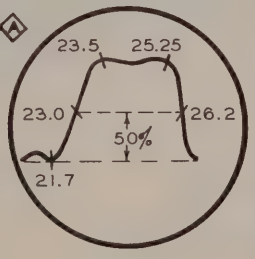

FIG. 2

FIG. 3

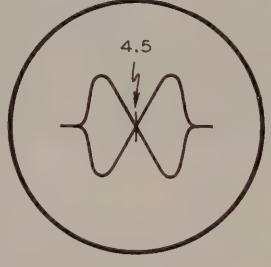

FIG. 4

ALIGNMENT INSTRUCTIONS (cont)

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OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Leave the bias battery connected as under "Video IF Alignment".
The channel oscillator adjustment screws are reached thru a hole just to the right of the channel switch shaft. The correct oscillator adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid- position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 22KΩ to point (A). Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 6. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

RF AND MIXER ALIGNMENT

Remove the 4.5 volt bias battery from C30.
Connect the negative side of a 1.5 volt bias battery to the ungrounded side of C26.
Connect the positive side to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 22KΩ to point (D). Low side to chassis.	A24, A25, A26	Adjust for response similar to Fig. 7 with markers above 90%.
12.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 7. If markers fall below 70% on any channel make compromise adjustments of A24, A25 and A26 with channel switch set to that channel, then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

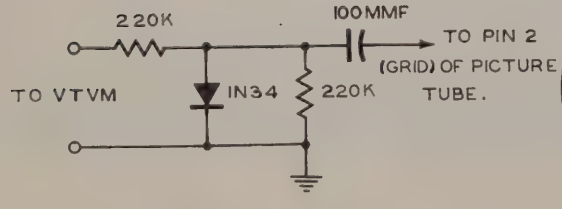


FIG.5

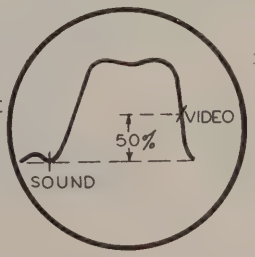


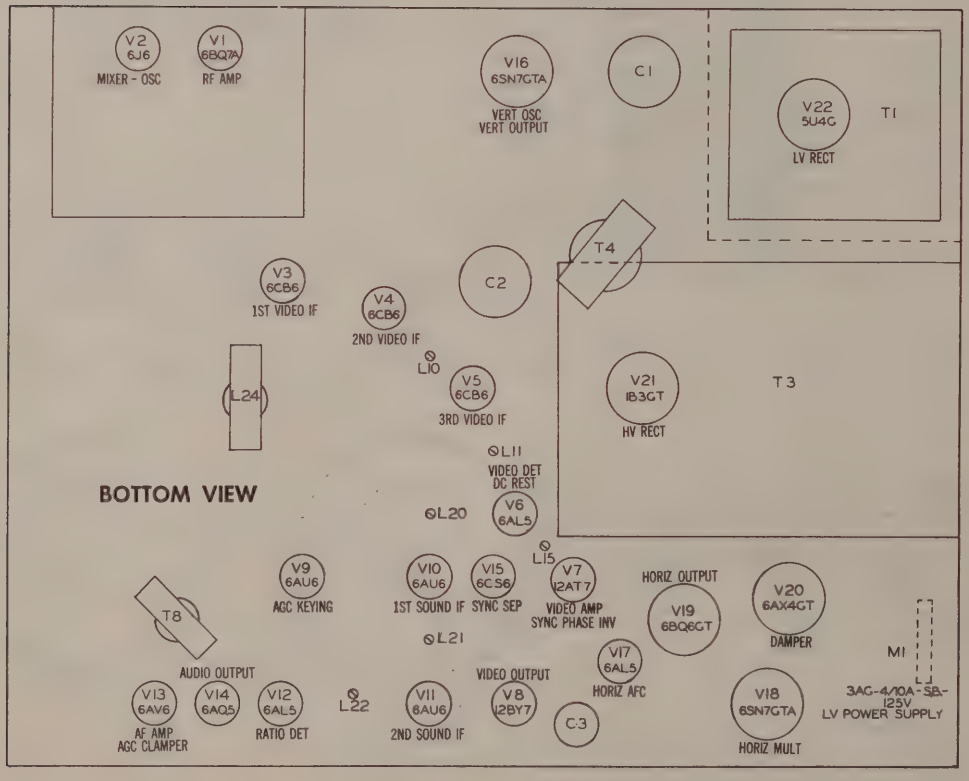
FIG.6

FIG.7

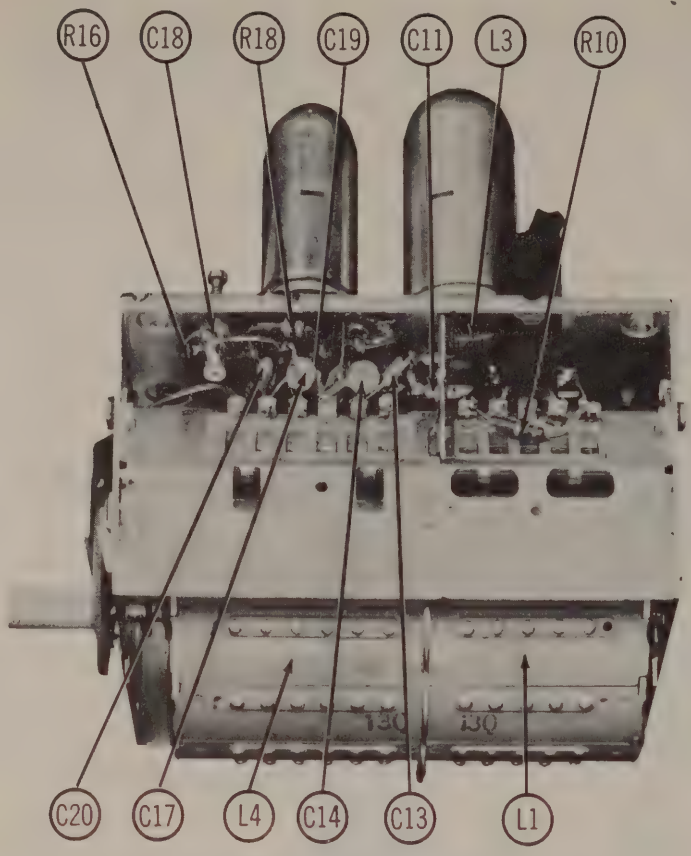
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	800KΩ	0Ω	.1Ω	0Ω	†1.9KΩ	160KΩ	INF	0Ω
V 2	6J6	†17KΩ	†2.4KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	108KΩ	47Ω	0Ω	.1Ω	†3.4KΩ	†3.4KΩ	0Ω		
V 4	6CB6	101KΩ	47Ω	0Ω	.1Ω	†3.4KΩ	†3.4KΩ	0Ω		
V 5	6CB6	.3Ω	180Ω	0Ω	.1Ω	†3.4KΩ	†3.4KΩ	0Ω		
V 6	6AL5	1Meg	4.7KΩ	0Ω	.1Ω	.2Ω	0Ω	0Ω		
V 7	12AT7	†9.5KΩ	4.7KΩ	.3Ω	0Ω	0Ω	†5.7KΩ	†820KΩ	3.3KΩ	.1Ω
V 8	12BY7	600Ω	1Meg	0Ω	.1Ω	.1Ω	0Ω	†4.4KΩ	†2.4KΩ	0Ω
V 9	6AU6	†37KΩ	†2.4KΩ	0Ω	.1Ω	450KΩ	†370Ω	†2.4KΩ		
V 10	6AU6	2.4Ω	0Ω	.1Ω	0Ω	†3.4KΩ	†3.4KΩ	100Ω		
V 11	6AU6	56KΩ	0Ω	.1Ω	0Ω	†3.4KΩ	†25KΩ	0Ω		
V 12	6AL5	INF	INF	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 13	6AV6	10Meg	0Ω	.1Ω	0Ω	800KΩ	800KΩ	†470KΩ		
V 14	6AQ5	470KΩ	330Ω	0Ω	.1Ω	†1.9KΩ	†1.4KΩ	470KΩ		
V 15	6CS6	60KΩ	0Ω	.1Ω	0Ω	†1Meg	†100KΩ	1.5Meg		
V 16	6SN7GTA	5Meg	■2.5Meg	190Ω	2.2Meg	■10KΩ	1.8KΩ	0Ω	.1Ω	
V 17	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	10KΩ	INF	10KΩ		
V 18	6SN7GTA	5.2Meg	†4.8KΩ	1.5KΩ	180KΩ	†250KΩ	1.5KΩ	.1Ω	0Ω	
V 19	6BQ6GT	6.8KΩ	0Ω	470KΩ	†17KΩ	470KΩ	8.2KΩ	.1Ω	100Ω	TOP CAP ■15Ω
V 20	6AX4GT	†40Ω	INF	150KΩ	†47KΩ	†60Ω	INF	.1Ω	0Ω	
V 21	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ■435Ω
V 22	5U4G	INF	40KΩ	INF	20Ω	INF	22Ω	INF	40KΩ	
V 23	21ZP4B	0Ω	1.1Meg	PIN 10 ■6.8KΩ	PIN 11 †320KΩ	PIN 12 .1Ω				

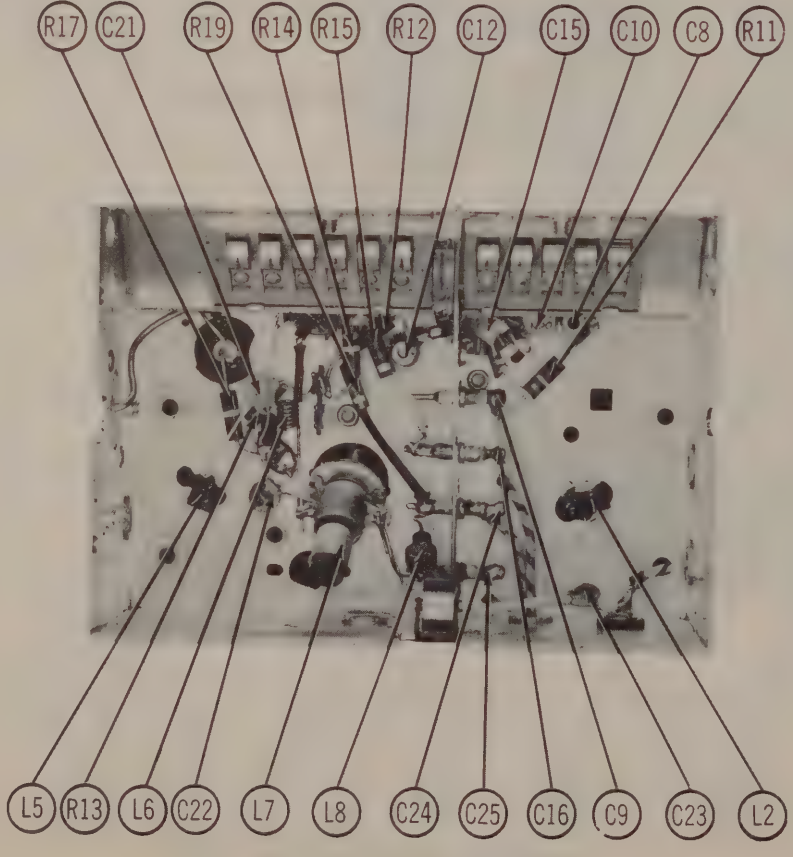
† MEASURED FROM PIN 2 OF V22
■ MEASURED FROM PIN 3 OF V20



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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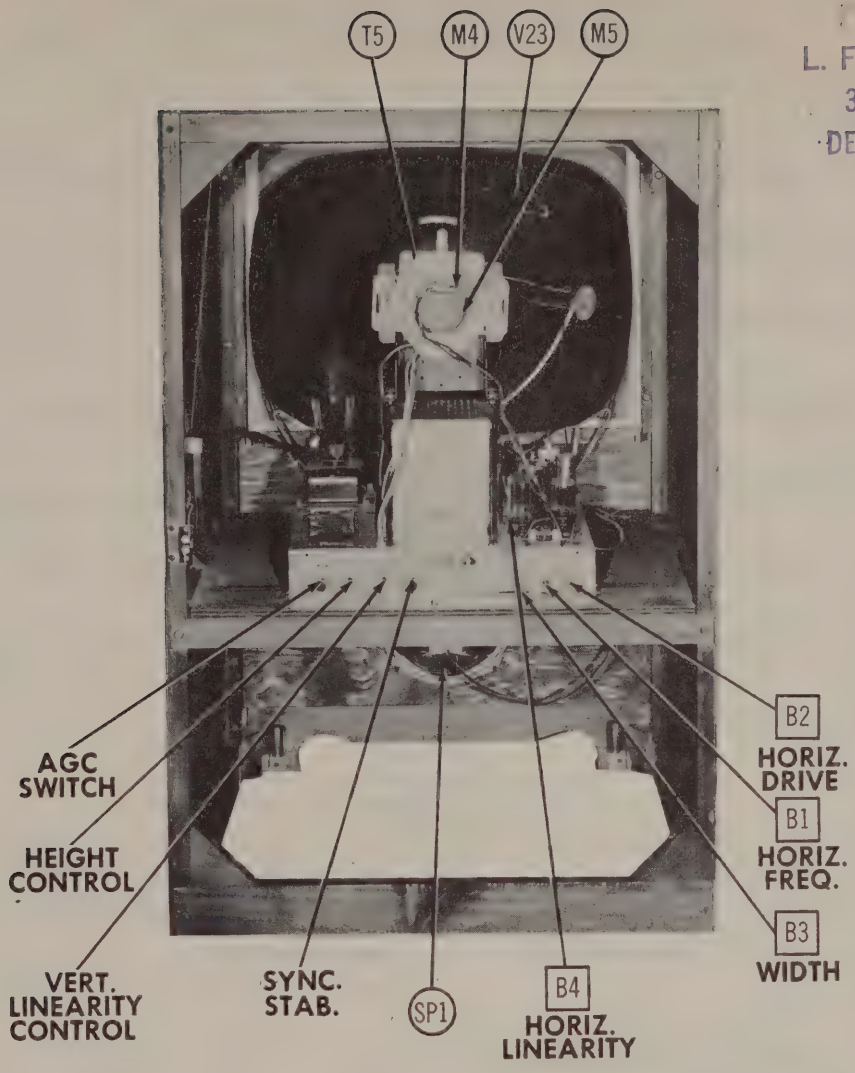

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control to its mid-range position and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally. Switch off channel and back again. The picture should pull into sync and remain in sync thru 90 degree rotation of horizontal hold control.

Turn the contrast control maximum counter clockwise and adjust the brightness control for a washed out picture.

Adjust the horizontal drive trimmer (B2) clockwise as far as possible without the presence of a vertical white line near the center of the raster.

Adjust the width coil (B3) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity coil (B4) for a picture that is symmetrical from left to right.

Recheck setting of B2 then repeat horizontal oscillator adjustment (B1) as above.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check adjustments B2, B3 and B4. Check by substitution V19, V20 and V22. Check T3, T5A, T7, R101, R102 and other associated components.

DRIVE LINES

Check adjustment B2. Check substitution V19 and V20. Check T3, T5A, T6, C5, R100, R101, R102 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V19 and V20. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V18, V19 and V20. Check C73 for open. Check R91, L23, C74 and other associated components.

XMAS TREE EFFECT

Check by substitution V18, V19 and V20. Check T3 and T5A for internal arcing. Check L23, C74, C75, R92, R94, R91 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V16. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R8, R78, R79, C2B and other associated components.	Check T2, C65, C61, R76, R75 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V16. Check height and vertical linearity controls for proper operation. Check T4 and T5B.

COMPRESSED AT BOTTOM

Substitute V16. Check R7, R76, C63 and other associated components.

COMPRESSED AT TOP

Substitute V16. Check R8, R78, C2B, C65 and other associated components.

FOLDS

Substitute V16. Check C63, R80, R78 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V15 and V7. Check R68, R66, R69, R71, C58, C59, C57 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V16. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T2, C61, C62, R75, R74, R5 and other associated components.	Check vertical integrator network for component failure or change of value. Check video IF alignment for overloading.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V17 and V18. Check horizontal AFC network. Check C68, C69, C74, L23, R92, R93, R2 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V15, V17 and V18. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Check by substitution V7 and V8. Check C40, C41, R31, R35, R36, L19, L18, L16, L17 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A11. Check video IF alignment.

POOR CONTRAST

Check by substitution V7 and V8. Check contrast control, picture tube, L18, R35 and R36. Check video detector network.

NEGATIVE PICTURE

Check by substitution V7 and V8. Check video detector network. Check C41, picture tube and contrast control.

SMEAR

Check by substitution V7 and V8. Check L13, L14, L16, L17, L18, C41 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12, V13 and V14. Check stages of V13 and V14 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C54, C55A, C56, R63, R61A, R62, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A10. If still unsatisfactory, check audio IF alignment and C7.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Wells-Gardner PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BQ7A	6BQ7A	9AJ	6BQ7 or 6BZ7 used in some versions
V2	Mixer - Osc.	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Detector-DC Restorer	6AL5	6AL5	6BT	
V7	Video Amp.-Sync Phase Inv.	12AT7	12AT7	9A	
V8	Video Output	12BY7	12BY7	9BF	
V9	AGC Keying	6AU6	6AU6	7BK	
V10	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V11	2nd. Sound IF Amp.	6AU6	6AU6	7BK	
V12	Ratio Det.	6AL5	6AL5	6BT	
V13	AF Amp-AGC Clamper	6AV6	6AV6	7BT	
V14	Audio Output	6AQ5	6AQ5	7BZ	
V15	Sync Separator	6CS6	6CS6	7CH	
V16	Vert. Osc.-Vert. Output	6SN7GTA	6SN7GTA	8BD	
V17	Horiz. AFC	6AL5	6AL5	6BT	
V18	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V19	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V20	Damper	6AX4GT	6AX4GT	4CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	LV Rectifier	5U4G	5U4G	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	Wells-Gardner PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V23	21ZP4B	21ZP4B 21ZP4A	21ZP4B 21ZP4A	21ZP4B 21ZP4A 21ZP4 ①	21ZP4B 21ZP4A	12N 12N	① Circuit changes necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲80	400	45X390	AFH3-46		B081		FP229.4	TVL-3730	
B	▲60	400								
C2A	▲80	400	45X391	AFH3-142		C109		FP229.8	TVL-3757	
B	▲100	50								
C3A	■20	400	45X392	AFH3-137		C097		FP366	TVL-3751	
B	▲10	400								
C	40	50								
C4	30	400	45X393	PRS450/30		BR3045		TC77	TVA-1711	
C5	5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C6	4	100	45X361	PRS150/4		BR415		TC40	TVA-1402	
C7	5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C8	3-9		31B-207		829-10					
C9	800		13D-153	EF-001	MFT-1000				503C-D1	
C10	3.6		CD8C3R6C	SI3.3NP0	TCZ-3.3	Z008	NP0K-3R3	ZT-5533	5TCCB-V33	
C11	800		13D-196	EF-001	MFT-1000				503C-D1	
C12	.5-3		31B-206		829-3		3115-01-0R5	CT565A		
C13	1.5		CD8C1R5N	SI1.5NP0	TCZ-1.5	Z004	NP0K-1R5	ZT-5515	5TCCB-V15	
C14	47		CD8Q470K	BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C15	1000		CD8X102Z	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C16	800		13D-153	EF-001	MFT-1000				503C-D1	
C17	47		CD8Q470K	BPD-000047	D6-470	G033	801-470	UC-5447	5GA-Q47	
C18	.5-3		31B-206		829-3		3115-01-0R5	CT565A		
C19	10		CD10C100K	SI10NP0	TCZ-10	Z018	NP0K-100	ZT-541	5TCC-Q1	
C20	5		CD8U050C							
C21	1000		CD8X102Z	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C22	6.8		CD8C6R8C	SI6.8NP0	TCZ-6.8	Z013	NP0K-6R8	ZT-5568	5TCCB-V68	
C23	120		13D-055	BPD-00012	D6-121	G044	801-121	UC-5312	5GA-T12	
C24	800		13D-153	EF-001	MFT-1000				503C-D1	
C25	800		13D-153	EF-001	MFT-1000				503C-D1	
C26	.22	200	RCP10M2224M	P288-22		CUB2P22		PT4022	2TM-P22	
C27	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C28	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C29	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C30	.22	200	RCP10M2224M	P288-22		CUB2P22		PT4022	2TM-P22	
C31	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C32	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	Note 1
C33	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C34	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C35	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	Note 1
C36	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C37	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C38	5		47X562	SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCCB-V47	
C39	360	500	47X568	1469-361		5R5T36				
C40	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C41	.1	400	RCP10M4104M	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C42	.1	200	RCP10M2104M	P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C43	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C44	1.5		47X584	SI1.5NP0	TCZ-1.5	TZ04	NP0K-1R5	ZT-5515	5TCCB-V15	
C45A	10000		80X6	BPD-2X01	DD3-103	DK082	811-01	DCD-511	5HK-2S1	
B	10000						811-01			
C46	100		47X604	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C47	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C48	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C49	330	500	47X570	1468-331	D6-331	5W5T33	GP2K-331		5GA-T33	
C50	470	500	47X525	1468-471	D6-471	5W5T47	GP2K-471	MC245	1FM-35	
C51	.047	200	RCP10M2473M	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C52	.0047	400	RCP10M4472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C53	.0047	400	RCP10M4472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C54	5000		47X507	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C55A B C	.01 250		†76X5	†PA-112-3	†PC-80	†113TM1	†1404-01		†T-1	
C56	.0047	600	RCP10M6472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C57	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C58	.01	400	RCP10M4103M	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C59	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C60A	.002							PT622		
B	.005		♦76X7	♦PA-110	♦PC-100	♦115TM1	♦1405-01	PT625	♦V-1	
C	.005							PT625		
C61	4700	500	47X543	1464-472		1R5D47		MCE465	MS-25	
C62	.022	200	RCP10M2223M	P288-022	DF-203	CUB2S22	817-02	PT4122	2TM-S22	
C63	.047	600	RCP10M6473M	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C64	.022	200	RCP10M2223M	P288-022	DF-203	CUB2S22	817-02	PT4122	2TM-S22	
C65	.1	600	RCP10M6104M	P688-1	DF-104	CUB6P1		PT601	6TM-P1	
C66	.047	600	RCP10M6473M	P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C67	.015	600	RCP10M6153M	P688-015		CUB6S15		PT6115	6TM-S15	
C68	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C69	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C70	.01	400	RCP10M4103M	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C71	270	500	RCM20A271K	1469-271		22R5T27		MCB241	MS-33	
C72	.0047	400	RCP10M4472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C73	.047	200	RCP10M2473M	P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C74	4700	500	47X543	1464-472		1R5D47		MCE465	MS-25	
C75	360	500	47X568	1469-361		5R5T36				
C76	.1	400	RCP10M4104M	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C77	330	500	47X570	1469-331		5R5T33				
C78	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C79	.1	400	RCP10M4104M	P488-1		CUB4P1		PT401	4TM-P1	
C80	.047	400	RCP10M4473M	P488-047		CUB4S47		PT4147	4TM-S47	
C81	500	20000	47X560	HV20C	TV3-502	MMU20T5	413	HV20035A	20DK-T5	
C82	.15	400	RCP10M4154M	P488-15		CUB4P15		PT4015	4TM-P15	
C83	10000		47X615	BPD-01	DD-103	K082	811-01	DC-511	5HK-S15	
C84	10000		47X615	BPD-01	DD-103	K082	811-01	DC-511	5HK-S15	

Note 1. Not used in all versions .
† Items C55A, C55B, C55C, R61A, R61B are combined in one unit.
When replacing items separately C55B and C55C should total 250MMF.
♦ Items C60A, C60B, C60C, R72A, R72B, R72C are combined in one unit.

CONTROLS

ITEM No.	RATING RESIST-ANCE	RATING WATTS	Wells-Gardner PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	½	B78X19	*QJ-601		F1-2		Contrast - Panel
B	1Meg	½				R2-57		Volume - tapped ⓐ200KΩ-
C	Switch							Rear
						KB-2		Attach to R1B
R2A	50KΩ	½	B40X361-C	Q11-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	D8-37	Attach to R2A
R3A	1Meg	½	B40X334-E	Q11-138	A47-1.5Meg-S	AB-69	U-155	Tone
B	Shaft		Not Req.	NQ	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	500KΩ	½	B40X333-A	Q11-133	A47-500K-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	RS-3/16	AK-4	Not Req.	Attach to R4A
R5A	1Meg	½	B40X334-E	Q11-138	A47-1.5Meg-S	AB-69	U-155	Vert. Hold
B	Shaft		Not Req.	NQ	KSS-3	AK-4	Not Req.	Attach to R5A
R6A	2.5Meg	½	B40X369A	Q11-239	A47-2.5Meg-S	BX-83	SU-565	AGC
B	Shaft		Not Req.	RQ	FKS-1/4	Not Req.	Not Req.	Attach to R6A
R7A	2.5Meg	½	B40X369A	Q11-239	A47-2.5Meg-S	BX-83	SU-565	Height
B	Shaft		Not Req.	RQ	FKS-1/4	Not Req.	Not Req.	Attach to R7A
R8A	8000Ω	½	B40X375	Q11-116	A47-10K-S	AB-14	SU-20	Vert. Linearity
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	7.5Meg	½	B40X370A	Q11-142	A47-7.5Meg-S			Sync Stability
B	Shaft		Not Req.	Not Req.	FKS-1/4			Attach to R9A

* CONCENTRIKIT EQUIVALENT : KIT K-2, BASE ELEMENTS & SHAFTS : B11-108 & P1-310 (Panel)
B13-137X & R2-322 (Rear)
76-2 SWITCH

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTES
R10	15KΩ	½	12A-004	BTS-15K	
R11	47KΩ	½	12A-039	BTS-47K	
R12	100KΩ	½	12A-094	BTS-100K	
R13	160KΩ	½	12A-167	BTS-160K	
R14	100KΩ	½	12A-166	BTS-100K	
R15	1500Ω	½	12A-183	BTS-1500	
R16	10KΩ	½	12A-040	BTS-10K	
R17	220KΩ	½	12A-041	BTS-220K	
R18	10KΩ	½	12A-040	BTS-10K	
R19	15KΩ	½		BTS-15K	
R20	8200Ω	½	B83822	BTS-8200	
R21	47Ω 5%	½	B83470	BTS-47 5%	
R22	1000Ω	½	B85102	BTS-1000	
R23	22KΩ	½	B83223	BTS-22K	
R24	1000Ω	½	B85102	BTS-1000	
R25	47Ω 5%	½	B83470	BTS-47 5%	
R26	1000Ω	½	B85102	BTS-1000	
R27	22KΩ	½	B83223	BTS-22K	
R28	180Ω	½	B84181	BTS-180	
R29	1500Ω	½	B84152	BTS-1500	
R30	4700Ω 5%	1	B83472	BTA-4700 5%	
R31	5600Ω	1	C84582	BTA-5600	
R32	1500Ω	½	B84152	BTS-1500	
R33	1Meg	½	B84105	BTS-1Meg	
R34	68Ω	½	B84680	BTS-68	
R35	2000Ω 5%	2	D83202	BTB-2000 5%	
R36	2000Ω 5%	2	D83202	BTB-2000 5%	
R37	1Meg	½	B84105	BTS-1Meg	
R38	100KΩ	½	B84104	BTS-100K	
R39	22KΩ 5%	1	B84223	BTA-22K 5%	
R40	100KΩ	½	B85104	BTS-100K	
R41	47KΩ	½	B85473	BTS-47K	
R42	2200Ω	1	B84222	BTA-2200	
R43	33KΩ	½	B84333	BTS-33K	
R44	47KΩ	½	B84473	BTS-47K	
R45	470KΩ	½	B84474	BTS-470K	
R46	2.7Meg	½	B84275	BTS-2.7Meg	
R47	330KΩ	1	B83334	BTA-330K	
R48	100KΩ	½	B84104	BTS-100K	
R49	100Ω	½	B84101	BTS-100	
R50	1000Ω	½	B85102	BTS-1000	
R51	56KΩ	½	B84563	BTS-56K	
R52	33KΩ	½	B84333	BTS-33K	
R53	33KΩ	½	B84333	BTS-33K	
R54	1000Ω	½	B85102	BTS-1000	
R55	270Ω	½	B84271	BTS-270	
R56	10KΩ	½	B83103	BTS-10K	
R57	10KΩ	½	B83103	BTS-10K	
R58	68KΩ	½	B84683	BTS-68K	
R59	68KΩ	½	B84683	BTS-68K	
R60	10Meg	½	B85106	BTS-10Meg	
R61A	470KΩ	½	†76X5	BTS-470K	
B	470KΩ	½		BTS-470K	
R62	330Ω	1	C84331	BTA-330	
R63	1000Ω	1	D84102	BTA-1000	
R64	47KΩ	½	B84473	BTS-47K	
R65	270KΩ	½	B84274	BTS-270K	
R66	68KΩ	½	B84683	BTS-68K	
R67	1.5Meg	½	B84155	BTS-1.5Meg	
R68	10KΩ	½	B84103	BTS-10KΩ	
R69	820KΩ	½	B84824	BTS-820K	
R70	3300Ω 5%	½	B83332	BTS-3300 5%	
R71	3300Ω 5%	½	B83332	BTS-3300 5%	
R72A	22KΩ	½		BTS-22K	
B	8200Ω	½	♦76X7	BTS-8200	
C	8200Ω	½		BTS-8200	

RESI

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTE
R73	22KΩ 5%	1	B84223	BTA-22K 5%	
R74	3.3Meg 5%	½	B83335	BTS-3.3Meg 5%	
R75	22KΩ 5%	1	B84223	BTA-22K 5%	
R76	1.8Meg 5%	½	B84185	BTS-1.8Meg 5%	
R77	2.2Meg	½	B84225	BTS-2.2Meg	
R78	820Ω	½	B84821	BTS-820	
R79	6800Ω	2	D84682	BTB-6800	
R80	8200Ω	2	D84822	BTB-8200	
R81	2.2Meg	2	B84225	BTB-2.2Meg	
R82	220KΩ	2	B82284	BTB-220K	
R83	560Ω	½		BTS-560	
R84	100KΩ	½	B84104	BTS-100K	
R85	6800Ω	1	C84682	BTA-6800	
R86	27KΩ	½	B84273	BTS-27K	
R87	100KΩ	½	B84104	BTS-100K	
R88	4.7Meg	½	B85475	BTS-4.7Meg	
R89	470KΩ	½	B85474	BTS-470K	
R90	6800Ω	1	C84682	BTA-6800	

† Items R61A, R61B, C55A, C
♦ Items R72A, R72B, R72C, C
Note 1. Some versions may us
Note 2. Some versions may us
Note 3. Some versions may us
Note 4. Not used in all versio
Note 5. Some versions may u

TRANSFOR

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	Wells-Gardner PART No.	Sta PAR
T1	117VAC ⓐ1.7A	600VCT .230ADC	5VAC ⓐ3A	53X339A	P-8
	SEC. 3	SEC. 4	SEC. 5		
	6.3VAC ⓐ9.8A				

① Parallel and phase 6.3V ⓐ 9A and 1.2A windings for S
② Drill new mounting holes . Tape extra 6.3V winding.
③ Tape extra winding on high voltage Sec., also extra 6

TRANSFORMERS

ITEM No.	USE	Wells-Gardner PART No.	Halldorson PART No.	M PAR
T2	Vert. Osc. Trans.	54X10	B6702	A-3
T3	Horiz. Output Trans.	53X330 *	FB411 & RF800②	HV MW
T4	Vert. Output Trans.	51X168	Z1806 ①	A-3
T5A	Yoke-Horiz. (13MH)	9A2334-1	DF602 ③	MD
B	Vert. (46MH)			
T6	Horiz. Linearity-(1.2-6.6MH)	9A2262	RF800④⑧	MW
T7	Width (.1-.6MH)	9A2183		

① Drill one new mounting hole.
② Drill new mounting holes.
③ Use original yoke network and connect as in original
④ Enlarge mounting hole.
⑤ Connect to coded blue and red terminals.
⑥ Connect to coded #3 and #4 terminals.
⑦ Use original slider and core.

*HORIZONTAL OUTPUT T

Use Original Width Co

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Rep Co
	6	9	9	
	5	7	7	
	4	5	5	
	3	Note ⑩	Note ⑩	
	2	3	3	
	1	1	1	
	A	RF800 (#3 Term.)	MWC-1 (Orange Term)	
	G	RF800 (#4 Term.)	MWC-1 (Black Term)	
Connect Width Coil Across →	2 & 1	RF800 (#1 & #2 Term) 3 & 1	MWC-1 (Blue & red Term.) 3 & 1	21 2
Special Notes →		⑨	⑨	

⑧ Connect a 56MMF capacitor from term. "T" to op
⑨ If picture if out of phase, reverse primary or seco
⑩ Connect a 56MMF capacitor from term. #5 to open
⑪ Connect a 56MMF capacitor from term. #7 to open

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C55A	.01									
B	250		†7X65	†PA-113-3	†PC-80	†1137M1	†1404-01	†T-1		
C										
C56	.0047	600	RCP10M5472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6347	67M-D47	
C57	1000		80X1	BPD-001	DD-103	K069	801-001	DC-521	51K-D1	
C58	.01	400	RCP10M1103M	P488-01	D6-103	CUB4B1	GP2-333-103	PT411	47M-B1	
C59	.047	400	RCP10M4473M	P488-047	DF-503	CUB4B47		PT1447	47M-B47	
C59A	.002							PT623		
B	.005		▽7EX7	▽PA-130	▽PC-100	▽1137M1	▽1405-01	PT624	▽7-1	
C	.008							PT625		
C61	4700	500	47X543	1464-473		BR5D47		MCE465	MB-25	
C62	.022	300	RCP10M2233M	P288-023	DF-303	CUB2E23	817-09	PT1423	27M-E23	
C63	.047	600	RCP10M6473M	P688-047	DF-503	CUB6E47		PT6347	67M-E47	
C64	.033	300	RCP10M3333M	P288-033	DF-303	CUB2E33	817-09	PT1433	27M-E33	
C65	.1	600	RCP10M0104M	P688-1	DF-104	CUB6F1		PT601	67M-P1	
C66	.047	600	RCP10M6473M	P688-047	DF-503	CUB6E47		PT6347	67M-E47	
C67	.015	600	RCP10M6153M	P688-015		CUB6E15		PT6E15	67M-S15	
C68	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	51K-D1	
C69	1000		80X1	BPD-001	DD-102	K069	801-001	DC-521	51K-D1	
C70	.01	400	RCP10M4103M	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	47M-S1	
C71	270	500	RCM20A271K	1493-271		22R5727		MCB241	MS-32	
C72	.0047	400	RCP10M4472M	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	67M-D47	
C73	.047	200	RCP10M2473M	P288-047	DF-503	CUB2S47		PT1447	27M-S47	
C74	6100	500	47X543	1464-473		BR5D47		MCE465	MB-25	
C75	500	500	47X588	1493-501		SR5T28				
C76	.1	400	RCP10M4104M	P488-1	DF-104	CUB4P1		PT401	47M-P1	
C77	330	500	47X570	1493-331		SR5T33				
C78	.047	400	RCP10M4473M	P488-047	DF-503	CUB4S47		PT1417	47M-S47	
C79	.1	400	RCP10M4104M	P488-1		CUB4P1		PT401	47M-P1	
C80	.047	400	RCP10M4473M	P488-047		CUB4S47		PT1447	47M-S47	
C81	500	20000	47X569	HV20C	TV3-502	MMU20T5	413	HV30035A	20DR-T5	
C82	.15	400	RCP10M4154M	P488-15		CUB4P15		PT4015	47M-P15	
C83	10000		47X615	BPD-01	DD-103	K082	811-01	DC-511	51K-S15	
C84	10000		47X615	BPD-01	DD-103	K082	811-01	DC-511	51K-S15	

Note 1. Not used in all versions.
† Items C58A, C58B, C59C, R61A, R61A, R61B are combined in one unit.
When replacing items separately C55B and C55C should total 250MMF.
✱ Items C80A, C80B, C80C, R72A, R72B, R72C are combined in one unit.

CONTROLS

ITEM No	RATING RESIST ANCE	RATING WATTS	Wells-Gardner PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	½	D78X19	*QJ-601		F1-2		Contrast - Panel
B	1Meg	½				R2-57		Volume - tapped @200KΩ- Rear
C	Switch					KB-2		Attach to R1B
R2A	50KΩ	½	B40X361-C	QU1-123	A47-50K-S	A3-31	U-35	Horiz. Hold
B	Shaft		Not Req.	NQ	RS-3/16	AK-4	DS-37	Attach to R3A
R3A	1Meg	½	B40X334-E	QU1-138	A47-1.5Meg-S	AB-59	U-155	Tone
B	Shaft		Not Req.	NQ	KZS-3	AK-4	Not Req.	Attach to R3A
R4A	500KΩ	½	B40X333-A	QU1-133	A47-500K-S	AB-58	U-50	Brightness
B	Not Req.		Not Req.	Not Req.	RS-3/16	AK-4	Not Req.	Attach to R4A
R5A	1Meg	½	B40X334-E	QU1-138	A47-1.5Meg-S	AB-59	U-155	Vert. Hold
B	Shaft		Not Req.	NQ	KZS-3	AK-4	Not Req.	Attach to R5A
R6A	2.5Meg	½	B40X389A	QU1-239	A47-2.5Meg-S	BX-83	SU-565	AGC
B	Shaft		Not Req.	RQ	FKS-1/4	Not Req.	Not Req.	Attach to R6A
R7A	2.5Meg	½	B40X389A	QU1-239	A47-2.5Meg-S	BX-83	SU-565	Height
B	Shaft		Not Req.	RQ	FKS-1/4	Not Req.	Not Req.	Attach to R7A
R8A	50000	½	B40X375	QU1-116	A47-10K-S	AB-14	SU-20	Vert. Linearity
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	7.5Meg	½	B40X370A	QU1-142	A47-7.5Meg-S			Sync Stability
B	Shaft		Not Req.	Not Req.	FKS-1/4			Attach to R9A

* CONCENTRIKIT EQUIVALENT : KIT K-3, BASE ELEMENTS & SHAFTS : B11-108 & P1-3(G (Panel)
B13-137K & R2-322 (Rear)
76-2 SWITCH

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No	IRC PART No.	NOTES
R10	15KΩ	½	12A-004	BTS-15K	
R11	47KΩ	½	12A-039	BTS-47K	
R12	100KΩ	½	12A-094	BTS-100K	
R13	160KΩ	½	12A-167	BTS-160K	
R14	100KΩ	½	12A-168	BTS-100K	
R15	150Ω	½	12A-183	BTS-150Ω	
R16	10KΩ	½	12A-040	BTS-10K	
R17	220KΩ	½	12A-041	BTS-220K	
R18	10KΩ	½	12A-040	BTS-10K	
R19	15KΩ	½		BTS-15K	
R20	8200Ω	½	B83822	BTS-8200	
R21	470 5%	½	B83470	BTS-47 5%	
R22	1000Ω	½	B83002	BTS-1000	
R23	22KΩ	½	B83223	BTS-22K	
R24	1000Ω	½	B83102	BTS-1000	
R25	47Ω 5%	½	B83470	BTS-47 5%	
R26	1000Ω	½	B83102	BTS-1000	
R27	22KΩ	½	B83223	BTS-22K	
R28	18Ω	½	B84181	BTS-180	
R29	1800Ω	½	B84183	BTS-1800	
R30	47000Ω 5%	½	B83472	BTA-4700 5%	
R31	5600Ω	1	C84582	BTA-5600	
R32	1500Ω	½	B84152	BTS-1500	
R33	1Meg	½	B84105	BTS-1Meg	
R34	680Ω	½	B84680	BTS-68	
R35	2000Ω 5%	2	D83202	BTB-2000 5%	
R36	2000Ω 5%	2	D83202	BTB-2000 5%	
R37	1Meg	½	B84105	BTS-1Meg	
R38	100KΩ	½	B84104	BTS-100K	
R39	22KΩ 5%	½	B84223	BTA-22K 5%	
R40	10KΩ	½	B85104	BTS-100K	
R41	47KΩ	½	B85473	BTS-47K	
R42	2200Ω	½	B84222	BTA-2200	
R43	33KΩ	½	B84333	BTS-33K	
R44	47KΩ	½	B84473	BTS-47K	
R45	470KΩ	½	B84474	BTS-470K	
R46	2.7Meg	½	B84275	BTS-2.7Meg	
R47	330KΩ	½	B83334	BTA-330K	
R48	100KΩ	½	B84104	BTS-100K	
R49	100Ω	½	B84101	BTS-100	
R50	1000Ω	½	B84102	BTS-1000	
R51	56KΩ	½	B84563	BTS-56K	
R52	33KΩ	½	B84333	BTS-33K	
R53	33KΩ	½	B84333	BTS-33K	
R54	1000Ω	½	B85102	BTS-1000	
R55	2700Ω	½	B84273	BTS-2700	
R56	10KΩ	½	B83103	BTS-10K	
R57	10KΩ	½	B83103	BTS-10K	
R58	68KΩ	½	B84683	BTS-68K	
R59	68KΩ	½	B84683	BTS-68K	
R60	10Meg	½	B85106	BTS-10Meg	
R61A	470KΩ	½	176X5	BTS-470K	
B	470KΩ	½		BTS-470K	
R62	330Ω	1	C84331	BTA-330	
R63	1000Ω	1	D84102	BTA-1000	
R64	47KΩ	1	B84473	BTS-47K	
R65	270KΩ	½	B84274	BTS-270K	
R66	68KΩ	½	B84683	BTS-68K	
R67	1.5Meg	½	B84155	BTS-1.5Meg	
R68	10KΩ	½	B84103	BTS-10K	
R69	820KΩ	½	B84824	BTS-820K	
R70	3300Ω 5%	½	B83333	BTS-3300 5%	
R71	3300Ω 5%	½	B83333	BTS-3300 5%	
R72A	22KΩ			BTS-22K	
B	8200Ω		▽7EX7	BTS-8200	
C	8200Ω			BTS-8200	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTES
R73	22KΩ 5%	1	B84233	BTA-33K 5%	
R74	3.3Meg	½	B83335	BTS-3.3Meg	
R75	22KΩ 5%	1	B84233	BTA-22K 5%	
R76	1.8Meg	½	B84185	BTS-1.8Meg	
R77	2.2Meg	½	B84225	BTS-2.2Meg	
R78	820Ω	½	B84821	BTS-820	
R79	6800Ω	½	D84682	BTS-6800	
R80	8200Ω	2	D84823	BTB-8200	
R81	2.2Meg	½	B84225	BTS-2.2Meg	
R82	330Ω	3	PT4323	BTW-330	
R83	560Ω	½		BTS-560	
R84	100KΩ	3	B84104	BTS-100K	
R85	6800Ω	1	C84683	BTA-6800	
R86	27KΩ	½	B84273	BTS-27K	
R87	100KΩ	½	B84104	BTS-100K	
R88	4.7Meg	½	B85475	BTS-4.7Meg	
R89	470KΩ	½	B85474	BTS-470K	
R90	68000Ω	1	C84682	BTA-6800	

† Items R61A, R61B, C55A, C55B, C55C are combined in one unit.
✱ Items R72A, R72B, R72C, C60A, C60B, C60C are combined in one unit.
Note 1. Some versions may use 1800Ω resistor in this application.
Note 2. Some versions may use a 5600Ω resistor in this application.
Note 3. Some versions may use a 220KΩ resistor in this application.
Note 4. Not used in all versions.
Note 5. Some versions may use a 5600Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	Wells-Gardner PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @1.7A	600VCT @.120ADC	5VAC @3A	53X339A	P-8337 ①		R-49BB ①		9715 ①	
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC @6.8A									

① Parallel and phase 6.3V @ 8A and 1.2A windings for Sec. #3.
② Drill new mounting holes . Tape extra 6.3V winding.
③ Tape extra winding on high voltage Sec., also extra 6.3V winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	Wells-Gardner PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Ram PART No.	Stancor TYPE No.	Thordarson PART No.	Triad PART No.
T2	Vert.Osc.Trans.	54X10	B9702	A-3063	209T1 ①	V405	A-8125	24A87 ①	A-99Z
T3	Horiz.Output Trans.	53X350 ✱	RF800 ②	F8411 & ✱	8997-8 & 8997-9 ✱	223T1 & ✱	A-8137 &✱	21A88 ①	FLY-14 &✱	D-38 & ✱
				MWC-1 ②	212R1 ②	X150 ✱	WC-5 ②	WC-20 ②	WC-11 ②	
T4	Vert.Output Trans.	51X168	21R6 ①	A-3039 ①	126T1 ①	V312 ①	A-8141 ①	26R54 ①	A-104X ①	
T5A	Yoke-Horiz.(53MZ)	54A2314-1	DF603 ③	MDF-72 ③	208D1 ③	Y70P14 ③	DY-9 ③	Y-4 ③	Y-17 ③	
B	Vert.(46MZ)									
T6	Horiz.Linearity-(L.S-6.6MH)	54A2263	RF800 ④⑤	MWC-6 ④	213R1	202R15	WC-8	WC-18 ④	WC-12 ④	
T7	Width (.1-.6MH)	54A2183			202R4 ④	202R18 ④	WC-4 ④	WC-15 ④	WC-13	

① Drill one new mounting hole.
② Drill new mounting holes.
③ Use original yoke network and connect as in original circuit.
④ Enlarge mounting hole.
⑤ Connect to coded blue and red terminals.
⑥ Connect to coded #3 and #4 terminals.
✱ Use original slider and cores.

✱HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6	9	9	10	13	7	9	9
				Jumper			
5	7	7	9	10 & 11	4	8 & 7	8 & 7
4	5	5	7	8	5	6	6
3	Note ⑯	Note ⑯	Note ⑪	4	Note ⑪	Note ⑯	Note ⑯
2	3	3	NC	2	3	3	T
1	1	1	3	1	1	1	
A	RF800 (#3 Term.)	MWC-1 (Orange Term)	2	9	WC-5 (Orange Term)	WC-20 (#1 Term)	(Orange Term)
G	RF800 (#4 Term.)	MWC-1 (Black Term)	6	8	WC-5 (Black Term)	WC-20 (#2 Term)	WC-11 (Black Term)
Consult With Coil Assembly	RF800 (#1 & #2 Term) 3 & 1	MWC-1 (Blue & red Term.) 3 & 1	212R1 2 & 1	3 & 1	WC-5 (Blue & red Term) 3 & 1	WC-20 (#3 & #4 Term) 3 & 1	WC-11 (Blue & red Term) T & 1
Special Notes	⑦	⑦			⑧	⑨	⑩

⑦ Connect a 56MMF capacitor from term. "T" to open end of R105 (Original term. #3 connection).
⑧ If picture if out of phase, reverse primary or secondary of replacement width coil.
⑨ Connect a 56MMF capacitor from term. #9 to open end of R105 (Original term. #3 connection).
⑩ Connect a 56MMF capacitor from term. #T to open end of R105 (Original term. #3 connection).

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	Wells-Gardner PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No	NOTES
			REPLACEMENT DATA						
T8	5.1KΩ	3.4Ω	51X166	A-3877	A-2930	S-3X	Z1107	24S51	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	Wells-Gardner PART No	JENSEN PART No	QUAM PART No	NOTES
				REPLACEMENT DATA			
SP1	8	PM	3.4Ω	12A518	8T-116 Mod.P8-U	8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI	DC RES SEC	Wells-Gardner PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
				REPLACEMENT DATA				
L1A	Ant.Coil	0Ω CT	0Ω	9A2278-1				Channel 2
B	Ant.Coil	0Ω CT	0Ω	9A2278-2				Channel 3
C	Ant.Coil	0ΩCT	0Ω	9A2278-3				Channel 4
D	Ant.Coil	0Ω CT	0Ω	9A2278-4				Channel 5
E	Ant.Coil	0Ω CT	0Ω	9A2278-5				Channel 6
F	Ant.Coil	0Ω CT	0Ω	9A2278-6				Channel 7
G	Ant.Coil	0Ω CT	0Ω	9A2278-7				Channel 8
H	Ant.Coil	0Ω CT	0Ω	9A2278-8				Channel 9
I	Ant.Coil	0Ω CT	0Ω	9A2278-9				Channel 10
J	Ant.Coil	0Ω CT	0Ω	9A2278-10				Channel 11
K	Ant. Coil	0Ω CT	0Ω	9A2278-11				Channel 12
L	Ant. Coil	0Ω CT	0Ω	9A2278-12				Channel 13
L2	Fil. Choke	0Ω		34A-548				
L3	Neut. Coil	0Ω		31B-296				
L4A	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-1				Channel 2
B	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-3				Channel 3
C	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-3				Channel 4
D	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-4				Channel 5
E	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-5				Channel 6
F	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-6				Channel 7
G	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-7				Channel 8
H	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-8				Channel 9
I	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-9				Channel 10
J	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-10				Channel 11
K	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-11				Channel 12
L	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-12				Channel 13
L5	Fil. Choke	0Ω		34A-575				
L6	RF Choke	0Ω		31B-295				
L7	Ist. Video IF	.8Ω		31A-278				
L8	R F Coil	1.3Ω		31B-230				
L9	2nd. Video IF	.3Ω	.3Ω	9A2230	17-1063	TV-116	6249	
L10	3rd. Video IF	.3Ω	.3Ω	9A2230	17-1064	TV-116	6250	
L11	Fil. Choke	0Ω		9A5033	19-3501	TV-159	4603	
L12	4th. Video IF	.3Ω	.3Ω	9A2333				Includes 21, TMC trap
L13	Series Peaking Coil	10Ω		36A25	19-7100 ✱	TV-181 ✱	4633 ✱	100 Microhenries, wound on 10KΩ resistor
L14	Shunt Peaking Coil	17Ω		36A27	19-3300		6155	325 Microhenries
L15	4.5MC Trap	.3Ω		9A2276	20-1004	TV-151	3689	
L16	Shunt Peaking Coil	6.5Ω		36A1	19-7100	TV-181	4632	100 Microhenries
L17	Shunt Peaking Coil	14Ω		36A23	19-7100 ▪	TV-181 ▪	4632 ▪	100 Microhenries, wound on 470Ω resistor
L18	Series Peaking Coil	13Ω		36A12	19-4160	TV-184 ▲	4544 ▲	160 Microhenries, wound on 22KΩ resistor
L19	Shunt Peaking Coil	14Ω		36A2	19-3180	TV-184	6180	190 Microhenries
L20	ist.Sound IF	2.4Ω		9A2201	16-3445 ▲	TV-13 †	1470A †	
L21	2nd.Sound IF	2.6Ω	2.3Ω	9A2323	16-3445 ▲	TV-13	6203	
L22	Ratio Det.	3.9Ω	.6Ω CT	9A2395	17-1033	TV-10	1468	Tertiary winding - .5Ω
L23	Horiz. Osc.	63Ω		9A2096	19-1576	TV-163	6210	

✱ Parallel with 10KΩ resistor.
▪ Parallel with 470Ω resistor.
▲ Parallel with 22KΩ resistor.
• Use one winding and drill mounting holes.
† Use one winding only.
▲ Drill new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	Wells-Gardner PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No	NOTES
			REPLACEMENT DATA						
T8	5.1KΩ	3.4Ω	51X166	A-3877	A-2930	S-3X	Z1107	24S51	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	Wells-Gardner PART No	JENSEN PART No	QUAM PART No	NOTES
				REPLACEMENT DATA			
SP1	8	PM	3.4Ω	12A518	8T-116 Mod.P8-U	8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI	DC RES SEC	Wells-Gardner PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
				REPLACEMENT DATA				
L1A	Ant.Coil	0Ω CT	0Ω	9A2278-1				Channel 2
B	Ant.Coil	0Ω CT	0Ω	9A2278-2				Channel 3
C	Ant.Coil	0ΩCT	0Ω	9A2278-3				Channel 4
D	Ant.Coil	0Ω CT	0Ω	9A2278-4				Channel 5
E	Ant.Coil	0Ω CT	0Ω	9A2278-5				Channel 6
F	Ant.Coil	0Ω CT	0Ω	9A2278-6				Channel 7
G	Ant.Coil	0Ω CT	0Ω	9A2278-7				Channel 8
H	Ant.Coil	0Ω CT	0Ω	9A2278-8				Channel 9
I	Ant.Coil	0Ω CT	0Ω	9A2278-9				Channel 10
J	Ant.Coil	0Ω CT	0Ω	9A2278-10				Channel 11
K	Ant. Coil	0Ω CT	0Ω	9A2278-11				Channel 12
L	Ant. Coil	0Ω CT	0Ω	9A2278-12				Channel 13
L2	Fil. Choke	0Ω		34A-548				
L3	Neut. Coil	0Ω		31B-296				
L4A	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-1				Channel 2
B	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-3				Channel 3
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F	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-6				Channel 7
G	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-7				Channel 8
H	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-8				Channel 9
I	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-9				Channel 10
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K	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-11				Channel 12
L	RF, Mixer Grid & Osc. Coil	0Ω		9A2279-12				Channel 13
L5	Fil. Choke	0Ω		34A-575				
L6	RF Choke	0Ω		31B-295				
L7	Ist. Video IF	.8Ω		31A-278				
L8	R F Coil	1.3Ω		31B-230				
L9	2nd. Video IF	.3Ω	.3Ω	9A2230	17-1063	TV-116	6249	
L10	3rd. Video IF	.3Ω	.3Ω	9A2230	17-1064	TV-116	6250	
L11	Fil. Choke	0Ω		9A5033	19-3501	TV-159	4603	
L12	4th. Video IF	.3Ω	.3Ω	9A2333				Includes 21, TMC trap
L13	Series Peaking Coil	10Ω		36A25	19-7100 ✱	TV-181 ✱	4633 ✱	100 Microhenries, wound on 10KΩ resistor
L14	Shunt Peaking Coil	17Ω		36A27	19-3300		6155	325 Microhenries
L15	4.5MC Trap	.3Ω		9A2276	20-1004	TV-151	3689	
L16	Shunt Peaking Coil	6.5Ω		36A1	19-7100	TV-181	4632	100 Microhenries
L17	Shunt Peaking Coil	14Ω		36A23	19-7100 ▪	TV-181 ▪	4632 ▪	100 Microhenries, wound on 470Ω resistor
L18	Series Peaking Coil	13Ω		36A12	19-4160	TV-184 ▲	4544 ▲	160 Microhenries, wound on 22KΩ resistor
L19	Shunt Peaking Coil	14Ω		36A2	19-3180	TV-184	6180	190 Microhenries
L20	ist.Sound IF	2.4Ω		9A2201	16-3445 ▲	TV-13 †	1470A †	
L21	2nd.Sound IF	2.6Ω	2.3Ω	9A2323	16-3445 ▲	TV-13	6203	
L22	Ratio Det.	3.9Ω	.6Ω CT	9A2395	17-1033	TV-10	1468	Tertiary winding - .5Ω
L23	Horiz. Osc.	63Ω		9A2096	19-1576	TV-163	6210	

✱ Parallel with 10KΩ resistor.
▪ Parallel with 470Ω resistor.
▲ Parallel with 22KΩ resistor.
• Use one winding and drill mounting holes.
† Use one winding only.
▲ Drill new mounting hole.

WELLS-GARDNER MODELS
321GM47-486, 2321GM47-488

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	Wells-Gardner PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L24	.230ADC	40.6Ω	.83 Hy.	52X95	C-2326 ①	C-2996 ①	C-23X ①	C5037 ①	26C44

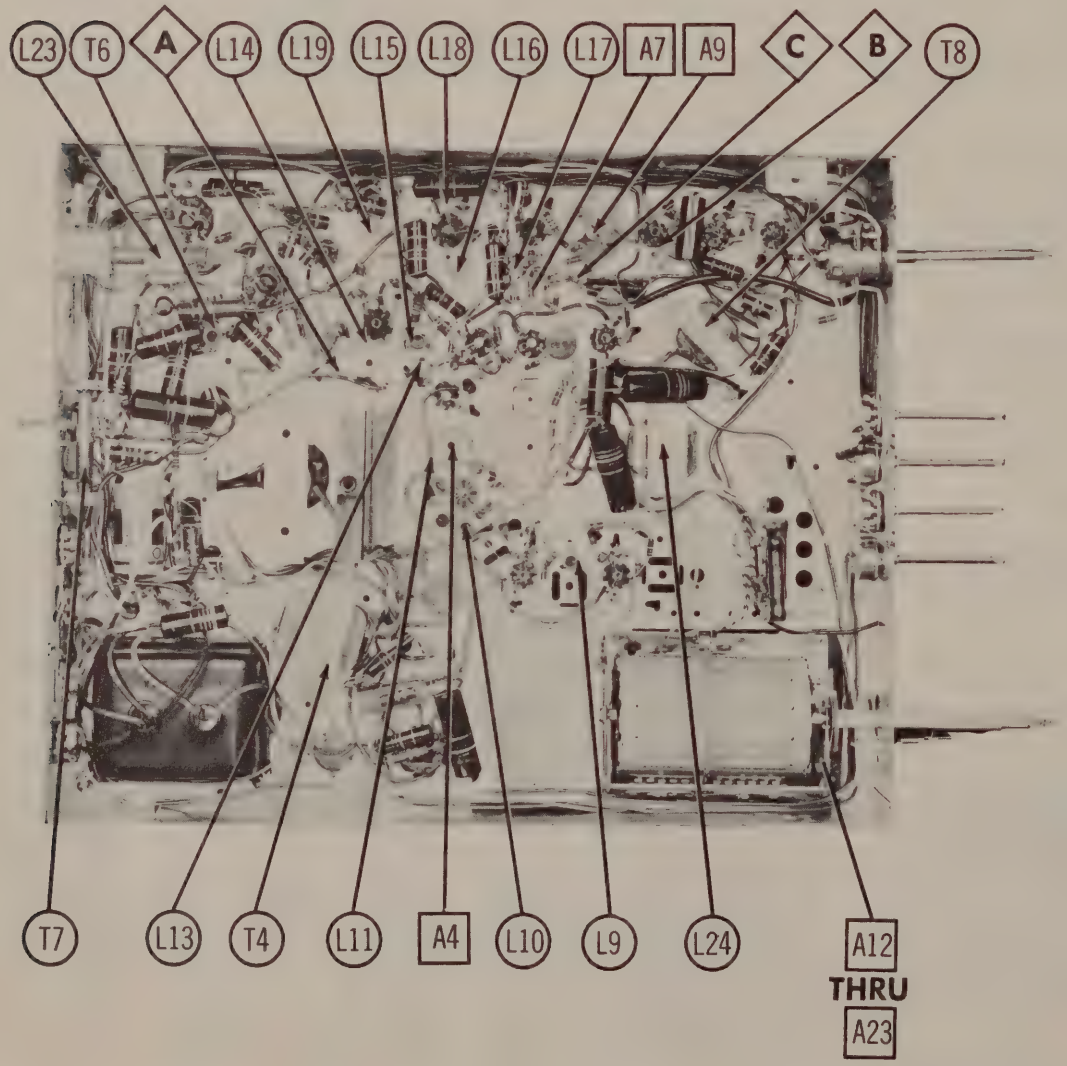
① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Wells-Gardner PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10 A 125 V.	16X147-3	16X146	313. 400 (4/10 A-3AG-S/B)	357001	MDL 4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	Wells-Gardner PART No.	NOTES
M2	Dial Light	7A32	Bayonet, type # 51
M3	Tuner	25A1095	VHF
M4	Focus Magnet	2A438-2	Includes centering device
M5	Ion Trap	2A421	
B2	Trimmer Cap.	17A269	Horiz. Drive (120—400 MMF)
	Knob	10A820-1	Fine Tuning
	Knob	10A821-1	Contrast
	Knob	10A812-1	Channel Selector
	Knob	10A779	Off/on-volume
	Knob	10A826	Red -Secondary controls
	Safety Glass	17X180	
	Mask	4X1230-1	



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

PROPERTY OF
L. F. BLANK
3924 MEADE ST.
DENVER, COLORADO

TROUBLE SHOOTING AIDS (cont)

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V22. Check M1 fuse. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V22. Check B+ filter and decoupling network.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V18, V19, V20 and V21. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, T7, C79, C80, C82, C78, R101, R102 and other associated components.	Check L23, C74, C75, R94, R92, R91 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, V21 and V22. Check adjustments B2, B3, and B4. Check R100, R101, R102, R99, C77, C79, C80, C82 and other associated components.

BLOOMING

Check by substitution V18, V19, V20, V21 and V22. Check R104, R103 and R100. Check adjustments B2 and B4.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video ".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak Or No Sound ".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7, V8 and V9. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removal of the Channel Selector and Fine Tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the Channel Selector shaft.

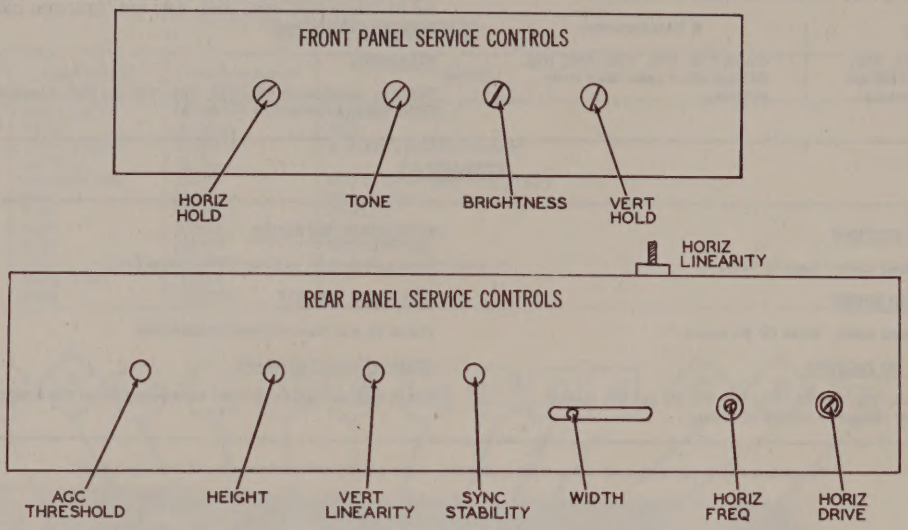
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 5 wood screws holding metal molding at top of the safety glass. Remove metal strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS: AGC THRESHOLD CONTROL

Tune in the strongest TV station available.

Turn the AGC threshold control clockwise until a buzz in the sound and a washed out picture appears, then turn the control slightly counter clockwise for clearest picture and best sound.

SYNC STABILITY CONTROL

With the picture locked in slowly turn the sync stability control clockwise until bending occurs at top of picture. Turn control SLIGHTLY counter clockwise until bending disappears. In general, the weaker the signal area the more clockwise the control should be turned.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the Horiz. Oscillator Circuit can be made from the rear panel of the chassis. Set the Horiz. Hold Control at the Mid-position of its range and adjust the Horiz. Freq. slug L23 until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary L22 located on top of chassis. (See tube placement chart.)

FUSES

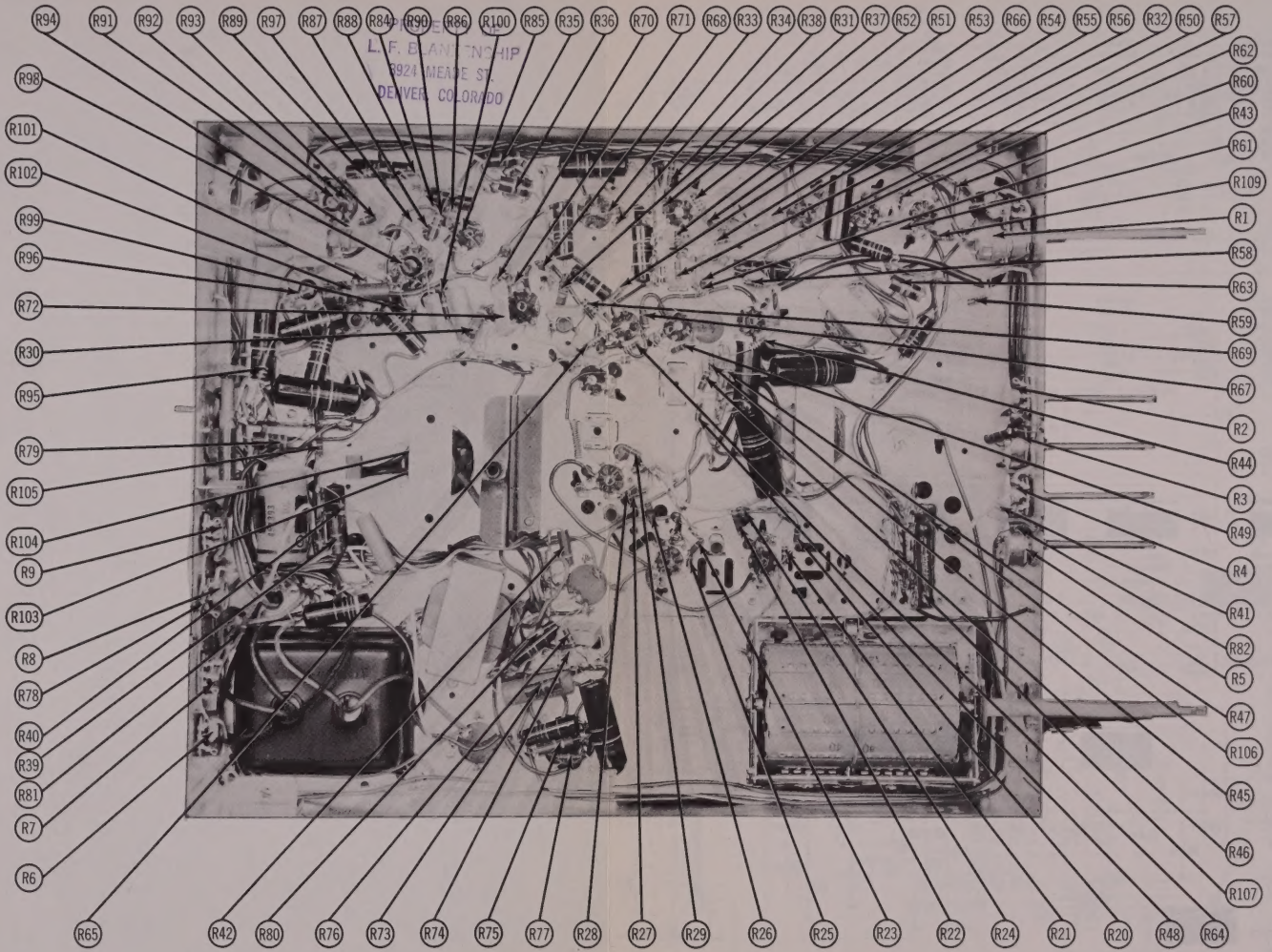
One fuse is used for L.V. Power Supply) protection. (For location see Tube Placement Chart.)

CENTERING

Cen tering is accomplished mechanically by means of a centering lever on the P.M. Focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 4 Push-on type control knobs from front panel.
2. Remove 4 wood screws. Remove rear cover.
3. Disconnect antenna lead from antenna terminal.
4. Disconnect speaker leads from speaker.
5. Remove 5 chassis bolts.
6. Remove chassis.
7. Remove 4 nuts from speaker. Remove speaker.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION